05-75-90

PICTORIAL AIDS

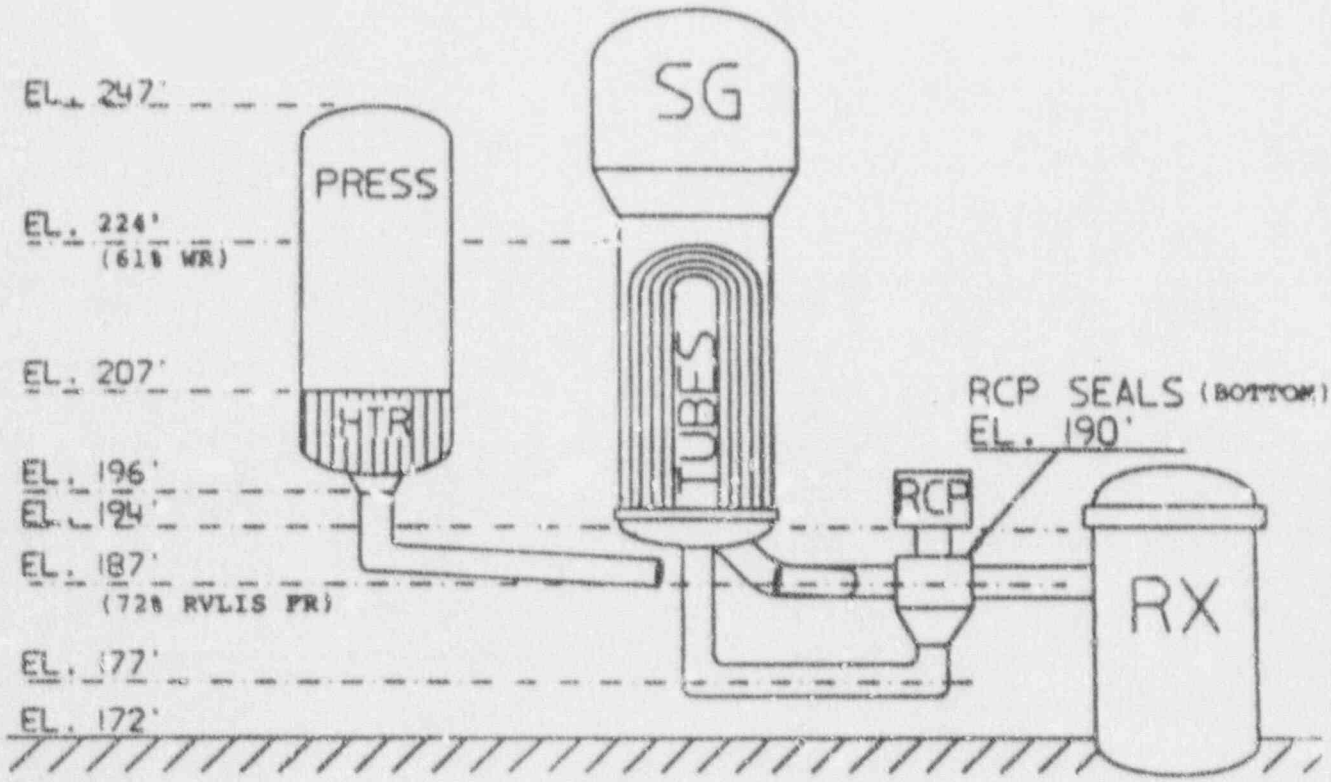
TAB	DESCRIPTION	PAGE
8.1	RCS ELEVATIONS	2
8.2	MID LOOP LEVEL INSTRUMENTATION	3

SEMI ANNUAL REVIEW

FOR INFORMATION ONLY

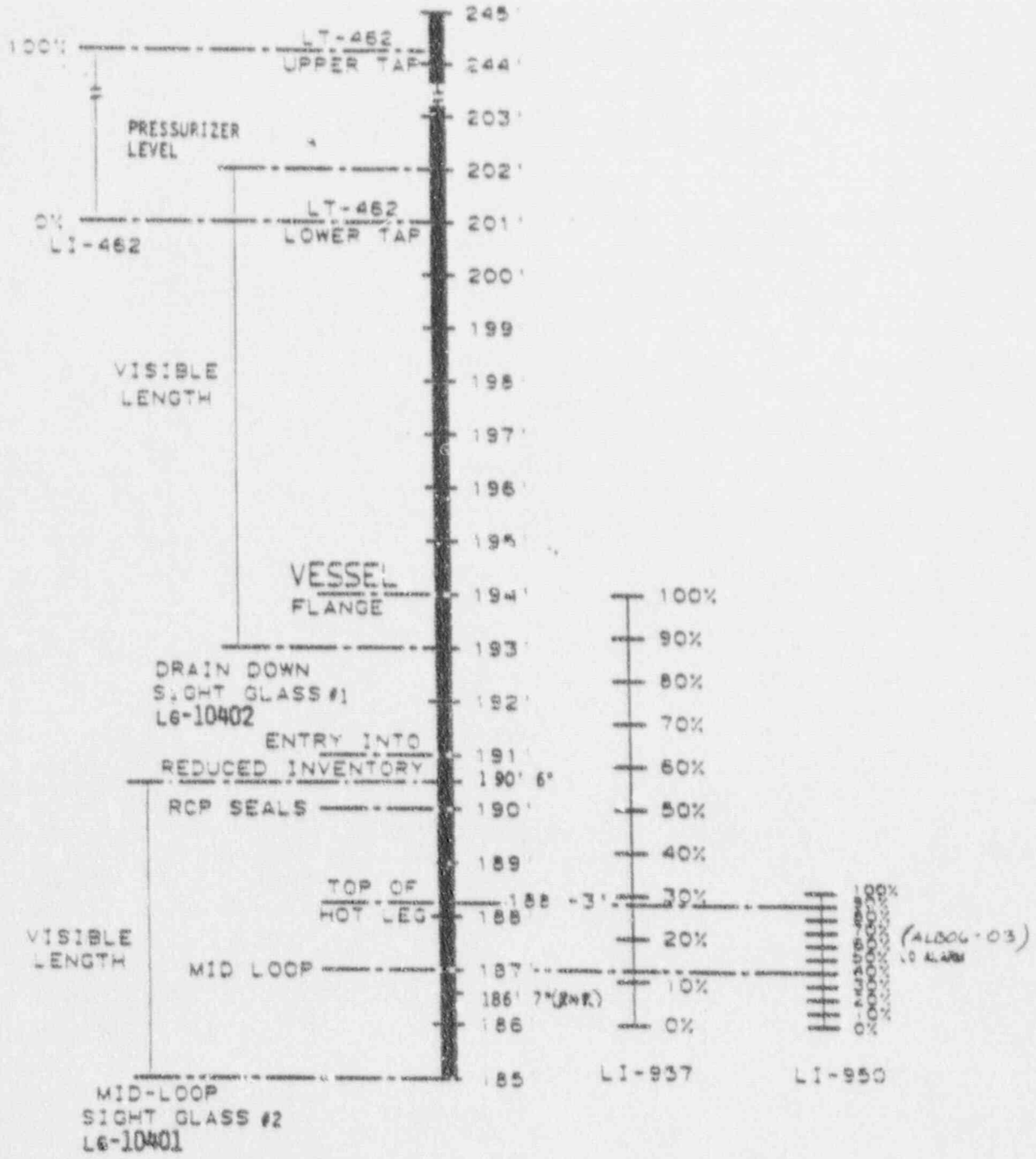
TAB 8.1
RCS ELEVATIONS
UNIT 1

VEGP
RCS ELEVATIONS



Gregory S Lee 3/2/90
Reviewed By Date

TAB 8.2
MID LOOP LEVEL
INSTRUMENTATION
UNIT 1



LI-950 RCS Loop 1 Hot Leg Narrow Range Level
LI-957 RCS Loop 4 Hot Leg Wide Range Level
NOTE: This Operator Aid is to be used only when in mid-loop configuration and temporary level instrumentation is installed.

Reviewed By 3/2/90
Date

703445

05-24-90

18015-C.Rev. 5
SECONDARY PLANT CHEMISTRY

NOT INCLUDED:
Is divided into various modes including MODES 4,5, AND 6 But does not involve Mid-loop issues.

18028-C,Rev. 7
LOSS OF INSTRUMENT AIR

SECTION B APPIES TO MODE 3
B6 NOTE states that if there is a loss of instrument air pressure, then MANUAL control of the SG Atmospheric Relief Valves will be required
SECTION C APPLIES TO MODES 4,5, AND 6
C5 CAUTION and step requires tripping one RHR Pump if tow are running due to RHR HX outlet valves failing full open.
C9 Requires tripping of running RHR Pump due to continued cooldown
C10 If RHR Temperature rises, actions are throt~le RHR Flow

18032-1,Rev. 4
LOSS OF 120 V AC INSTRUMENT POWER

NOT INCLUDED:
Written independent of mode to address concerns resulting from loss of 120 V AC 1E instrument power. Primarily addresses at power issures but may address some losses that affect a shutdown condition. Examples: (a) loss of 1NY1N addresses losses of AFW instrumentation which is a Shutdown concern, (b) loss of 1BY1B addresses a loss of SR SR countrate indication which would be a shutdown concern.

18034-1,Rev. 1
LOSS OF CLASS 1E 125V DC POWER
Written independent of mode to address concerns resulting from loss of 125 VDC 1E.

18038-C,Rev. 10
OPERATION FROM REMOTE SHUTDOWN PANELS
Not a midloop procedure, but does include ATTACHMENT G for local operation of SG Atmospheric Relief Valves.

19000-C,Rev. 4
ECA-0.0 LOSS OF ALL AC POWER
Does not apply to the midloop situation.

MIDLOOP PROCEDURES

12000-C,Rev. 16
REFUELING RECOVERY
(MODE 6 TO MODE 5)

2.1.4	WORK ACTIVITIES
2.2.2	TECH SPECS
2.2.13	RWST INVENTORY
4.1.5	CONTROLS WHEN BELOW 17 % PRZR LEVEL
4.1.10	MAINTAIN 1 FOOT ABOVE MID-NOZZLE,2 FEET IF SG NOZZLE DAMS INSTALLED

12006-C,Rev. 15
UNIT COOLDOWN TO COLD SHUTDOWN

2.1.4	WORK ACTIVITIES
2.2.6	TECH SPECS SG AVAILABLE
2.2.7	RHR AVAILABILITY IF NOT FILLED
2.2.17	RWST INVENTORY
D4.2.15	CONTROLS WHEN BELOW 17 % PRZR LEVEL

12007-C,Rev. 14
REFUELING ENTRY
(MODE 5 TO MODE 6)

2.1.17	WORK ACTIVITIES
2.2.6	TECH SPECS
2.2.15	RWST INVENTORY
4.1.1	CONTROLS WHEN BELOW 17 % PRZR LEVEL
4.1.3	MAINTAIN 1 FOOT ABOVE MID-NOZZLE

13005-1,Rev. 10
REACTOR COOLANT SYSTEM DRAINING

2.1.2	MAINTAIN 1 FOOT ABOVE MID-NOZZLE AND 6 INCHES IF BURPING SG TUBES WITHOUT USE OF NITROGEN PURGE
2.1.3	TREND RHR PUMP PARAMETERS WHEN AT 1 FOOT ABOVE MID-NOZZLE
2.1.8	CONTROLS IF DRAINING DOWN TO PERFORM MAINTENANCE ON REACTOR HEAD, SGs , OR RCP SEALS
2.1.9	ACTIONS IF LEVEL INDICATION LOST
2.1.10	ONLY ONE DRAIN PATH AT A TIME
2.1.11	NOT DRAIN FROM SAME LOOP AS BEING MONITORED FOR LEVEL
2.2.1	TECH SPECS ON SG LEVELS
4.1.2	HAS MAINTENANCE INSTALL TYGON TUBING AND DEFEAT RHR SUCTION VALVES AUTO CLOSURE INTERLOCK WHEN DRAINING VIA RCDT
4.1.8	CAUTION NOT DRAIN FROM SAME LOOP BEING MONITORED FOR RCS LEVEL
4.1.12	PLACES TYGON HOSE LEVEL INDICATIONS IN SERVICE
4.1.13	MAINTENANCE TO INSTALL REMOTE RCS TEMPORARY LEVEL INDICATION IF DRAINING BELOW 25 % PRZR LEVEL
4.1.15	CAUTION FOR DRAINAGE RATE AFFECT ON TYGON TUBING
4.1.18	USE NITROGEN TO ASSISTING DRAINING SG TUBES
4.1.19	CAUTIONS AND NOTES ABOUT DRAINING TO 1 FOOT ABOVE MID-NOZZLE
4.1.20	NOTE ABOUT DRAINING TO 1 FOOT ABOVE MID-NOZZLE
4.2.2	MAINTENANCE TO INSTALL REMOTE RCS TEMPORARY LEVEL INSTRUMENTATION IF DRAINING RCS BELOW 25%
4.2.11	PLACEMENT TO TYGON HOSE LEVEL INDICATION IN SERVICE
4.2.12	MAINTENCE TO INSTALL REMOTE RCS TEMPORARY LEVEL INSTRUMENTATION
4.2.14	CAUTION FOR DRAINAGE RATE AFFECT ON TYGON TUBING
4.2.18	USE NITROGEN TO ASSISTING DRAINING SG TUBES
4.2.19	CAUTIONS AND NOTES ABOUT DRAINING TO 1 FOOT ABOVE MID-NOZZLE
4.2.21	NOTE ABOUT DRAINING TO 1 FOOT ABOVE MID-NOZZLE
CHECKLIST 1	SG TUBE BUNDLE DRAINING

13011-1,Rev. 18
RESIDUAL HEAT REMOVAL SYSTEM

2.1.6	WHENEVER 1 FOOT ABOVE MID-NOZZLE THE RHR FLOW SHOULD BE LIMITED IN RANGE FROM 3000 TO 3500 GPM.
4.8.1	CAUTION THAT EXCESSIVE FLOWRATE DURING PUMPDOWN WITH UPPER INTERNALS ASSEMBLY INSTALLED COULD LEAD TO VOID FORMATION IN RHR PUMP SUCTION.

17006-1,Rev. 11
ANNUNCIATOR RESPONSE PROCEDURES FOR ALB 06 ON PANEL 1A2 ON MCB

PAGE 7	RCS LEVEL LOW PER ANNUNCIATOR WINDOW A03
PAGE 21	RHR PUMP OVERLOAD TRIP INITIATES 18019-C,LOSS OF RHR
PAGE 36	RWST EMPTY LEVEL ALARM INITIATES REFILLING

18004-C,Rev. 6
REACTOR COOLANT SYSTEM LEAKAGE

SECTION B ADDRESSES MODES 4 OR 5:
B1 NOTE IF RCS LEAKAGE IS DETECTED WHILE OPERATING WITH RCS LEVEL BELOW PRZR INDICATION RANGE OR WITH SG NOZZLE DAMS INSTALLED THEN GO TO 18019-C,LOSS OF RHR SYSTEM.
B5 RHR PUMP OPERATION INDICATIONS

18006-C,Rev. 2
FUEL HANDLING EVENT

12 SENDS OPERATOR TO 18004-C,RCS LEAKAGE IF SPENT FUEL POOL OR REACTOR CAVITY LOWERS UNEXPLAINABLY

18019-C,Rev. 7
LOSS OF RESIDUAL HEAT REMOVAL

SECTION A APPLIES TO MODES 4 OR 5
ENTIRE SECTION ADDRESSES MIDLOOP CONCERNS

SECTION B APPLIES TO MODE 6 WITH HEAD REMOVED
ENTIRE SECTION ADDRESSES MIDLOOP CONCERNS TO SOME EXTENT
SYMPTOMS ADDRESS MIDLOOP CONCERNS
A1 CAUTION,NOTE AND STEP ADDRESSES WCAP ISSUES

18020-C,Rev. 3
LOSS OF COMPONENT COOLING WATER

2RNO IF ONE TRAIN OF CCW CAN NOT BE PLACED IN SERVICE,THEN INITIATE 18019-C,LOSS OF RHR
4 IF NON-AFFECTED TRAIN RHR CAN NOT BE PLACED IN SERVICE, THEN INITIATE 18019-C,LOSS OF RHR

18021-C,Rev. 4
LOSS OF NUCLEAR SERVICE COOLING WATER SYSTEM

5RNO IF RHR CAN NOT BE ESTABLISHED TO AN OPERATING NSCW TRAIN, THEN INITIATE 18019-C, LOSS OF RHR

PTDB-1 TAB 8.0,Rev. 2
PICTORIAL AIDS

8.2 SHOWS LAYOUT OF REMOTE AND LOCAL TEMPORARY MID-LOOP INSTRUMENTATION

UNIT NO. _____ DATE 1 1

MID LOOP STEPS

REFUELING RECOVERY

05-17-90

(MODE 6 TO MODE 5)

2.1.4, 2.2.2, 2.2.13, 4.1.5, 4.1.10

7

1.0 PURPOSE

This procedure provides instructions for taking the unit from a refueling condition (Mode 6) to cold shutdown (Mode 5).

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

2.1.1 If the count rate on either Source Range Channel increases unexpectedly by a factor of two or more during any operation, the operation must be suspended immediately until a satisfactory evaluation of the situation has been performed.

2.1.2 Notify Health Physics prior to performing operations evolutions which may significantly alter radiation levels.

2.1.3 Notify Chemistry prior to installing or removing the Containment Equipment Hatch that containment ventilation flow will be changed during this evolution.

2.1.4 During periods of operation with the Reactor Coolant System (RCS) level below the Reactor Vessel Flange elevation (194 feet elevation), ongoing work activities should be closely scrutinized and any work activity limited that has the potential for reducing RHRS capability.

2.1.5 Inadvertent Containment Ventilation Isolation (CVI) may occur during the movement of the Reactor Vessel Head from the head stand to the cavity. Ensure Health Physics initiates compensatory actions to prevent inadvertent actuations.

2.2 LIMITATIONS

2.2.1 In Mode 5, shutdown margin shall be greater than or equal to the limit specified in Technical Specification 3.1.1.2, Figure 3.1-2.

2.2.2 When in Mode 5, with loops filled, at least one Residual Heat Removal train (RHR) shall be operable and in operation, and either:

REINFORCES MIDLOOP!

a. One additional RHR train shall be operable, or

b. The secondary side water level of at least two Steam Generators shall be greater than 17% of wide range level. (Technical Specification 3.4.1.4.1)

2.2.3 While in Mode 5, one RHR train may be inoperable for up to 2 hours for surveillance testing provided the other RHR train is operable and in operation. (Technical Specification 3.4.1.4.1)

2.2.4 While in Mode 5 with the RCS loops not filled, two RHR trains shall be operable and at least one RHR train shall be in operation. Reactor Makeup Water Valves 1208-U4-175, 1208-U4-176, 1208-U4-177, and 1208-U4-183 shall be closed and secured in position (by mechanical stops), except 1208-U4-176 and 1208-U4-177 may be opened for short periods of time for chemistry control provided the Hi Flux at Shutdown Alarm is operable with a setpoint of less than or equal to 2.30 times background. (Technical Specification 3.4.1.4.2)

2.2.5 When in Mode 6, with the water level greater than or equal to 23 feet above the Reactor Vessel Flange, at least one RHR train shall be operable and in operation. (Technical Specification 3.9.8.1)

2.2.6 When in Mode 6, with the water level less than 23 feet above the Reactor Vessel Flange, two RHR trains shall be operable and at least one RHR train in operation. (Technical Specification 3.9.8.2)

2.2.7 While in Modes 4, 5, and 6 with the Reactor Vessel Head on, at least one of the following Cold Overpressure Protection Systems shall be operable:

a. Two Power Operated Relief Valves (PORV) with lift settings which do not exceed the limits established in Technical Specification Figure 3.4-4, or

b. Two RHR Suction Relief Valves each with a setpoint of 450 psig ±3%, or

c. The RCS depressurized with an RCS vent capable of relieving at least 670 gpm water flow at 470 psig. (Technical Specification 3.4.9.3)

2.2.8 While in Modes 5 and 6, at least one of the following Boron Injection Flow Paths shall be operable.

a. A flow path from the Boric Acid Storage Tank via a Boric Acid Transfer Pump and a Charging Pump to the Reactor Coolant System if the Boric Acid Storage Tank in specification 3.1.2.5a is operable, or

b. The flow path from the Refueling Water Storage Tank (RWST) via a Charging Pump to the RCS if the Refueling Water Storage Tank in Specification 3.1.2.5b is operable. (Technical Specification 3.1.2.1)

2.2.9 The temperature of both the primary and secondary coolant in the Steam Generators shall be greater than 70 degrees when the pressure of either coolant in the Steam Generator is greater than 200 psig. (Technical Specification 3.7.2)

2.2.10 While in Mode 5 two channels of Source Range Nuclear Instrumentation shall be operable (Technical Specification 3.3.1). One channel should be selected to Recorder NR-45 with the SOURCE RANGE HI FLUX LEVEL AT SHUTDOWN alarm operable.

2.2.11 While in Mode 6 both Source Range Neutron Flux Monitors shall be operable with continuous visual indication in the Control Room and one with audible indication in the Containment and Control Room. (Technical Specification 3.9.2)

2.2.12 While in Mode 6 (whenever fuel is in the Reactor Vessel with the Reactor Vessel Head Closure Bolts less than fully tensioned or with the head removed) Keff shall be maintained at 0.95 or less, or the boron concentration shall be maintained greater than or equal to 2000 ppm, whichever is more restrictive. Additionally, valves 1208-U4-175, 1208-U4-177, 1208-U4-183 and 1208-U4-176 shall be closed and secured in position (by mechanical stops), except 1208-U4-176 and 177 may be opened for short periods of time for chemistry control provided the Hi Flux at Shutdown Alarm is operable with a setpoint of less than or equal to 2.30 times background. (Technical Specification 3.9.1)

2.2.13 While in Modes 5 and 6, with the RCS level below Reactor Vessel Flange elevation (194 feet elevation), the RWST will be operable with a minimum volume of 99,404 gallons (9% of instrument span) of water at a boron concentration between 2400 and 2600 ppm.

3.0 INITIAL CONDITIONS

3.1 The RHR System is in service aligned to the RCS at a minimum total flow of 3000 gpm.

3.2 The Reactor Coolant Drain Tank (RCDT) is aligned to support RCS and/or Refueling Cavity draining operations.

3.3 The Component Cooling Water (CCW) System is in service.

3.4 At least one Nuclear Service Cooling Water (NSCW) train is in service.

3.5 Two Source Range Channels are in operation and highest channel selected to Recorder NR-45.

a. SOURCE RANGE HI FLUX LEVEL AT SHUTDOWN alarm operable,

b. Audible count rate in Containment and Control Room operable.

3.6 Reactor Vessel Head not installed.

3.7 Fuel Pool To Transfer Canal Gate is closed.

3.8 Transfer Tube Gate Valve is closed and locked.

INITIALS

4.0 INSTRUCTIONS

NOTE

Asterisk (*) steps beside INITIALS spaces indicates steps that generate additional documents.

4.1 POST REFUELING MODE 6 OPERATIONS

4.1.1 As directed by the Outage Area Supervisor and when necessary, ADJUST the Refueling Cavity level to support the Reactor Vessel and Head assembly per 13011, "Residual Heat Removal System".

UNIT NO. _____ INITIALS

4.1.2 OBTAIN from the Control Room Mode Change Binder or OBTAIN from the Surveillance Tracking Coordinator all deferred (not performed) surveillance tests required for Mode 5 entry. _____

SCHEDULE and COMPLETE those applicable test procedures prior to Mode 5 entry.

NOTE

As a precaution, Containment Building Penetrations Technical Specification 3.9.4 will be established during periods of Reactor Vessel Head movement.

CAUTION

Inadvertent Containment Ventilation Isolation (CVI) may occur during the movement of the Reactor Vessel Head from the head stand to the cavity. Ensure Health Physics initiates compensatory actions to prevent inadvertent actuations.

4.1.3 Prior to setting the Upper Internals Assembly

a. NOTIFY Chemistry that closure of the Containment Equipment Hatch will change containment ventilation flow. _____

b. NOTIFY Maintenance to reset the Containment Personnel Lock Interlock System, _____

c. PERFORM 14210, "Containment Building Penetrations Verification-Refueling", _____ *

d. NOTIFY Chemistry to reset the PERMS Containment Low Range Area Monitors RE-0002 and RE-0003 alarm setpoint to 100 mR/hour. _____

e. INITIATE RWST cleanup per 13719, "Spent Fuel Pool Cooling And Purification System". _____

UNIT NO. _____ INITIALS

4.1.4 Prior to setting the Reactor Vessel Head, PERFORM the following:

a. VERIFY at least one of the Cold Overpressure Protection Systems operable by performing one of the following (Technical Specification 4.4.9.3):

(1) RHR Suction Relief Valves - VERIFY RHR Suction Valves open per 14000, "Operations Shift And Daily Surveillance Logs" and INITIATE shiftly surveillance per 14000, _____

(2) RCS Vent Path - VERIFY an RCS Vent Path per 14000, "Operations Shift And Daily Surveillance Logs" and INITIATE shiftly surveillance per 14000, _____

(3) PLACE the Cold Overpressure Protection System (COPS) in operation by performing the following:

(a) ENSURE PRZR PORV BLOCK VLV COLD OVERPRESSURE CNTL Handswitches HS-8000G and 8000H are in the BLOCK position, _____

(b) REQUEST I&C to perform an analog channel operational test on both PORV Actuation Channels per 24518, "Reactor Coolant Pressure (Wide Range) Protection II P-403 Analog Channel Operational Test And Channel Calibration" and 24519, "Reactor Coolant Pressure (Wide Range) Protection I P-405 Analog Channel Operational Test And Channel Calibration". _____ *

UNIT NO. _____ INITIALS

(c) VERIFY the following annunciators in alarm. _____

1 A COLD OP LOW AUCT RCS TEMP, (ALB 12 C04),

2 B COLD OP LOW AUCT RCS TEMP (ALB 12 C05).

(d) ARM the A and B COPS by placing handswitches HS-8000G and 8000H to ARM position, _____

(e) VERIFY the following annunciators alarmed upon arming COPS: _____

1 A COLD OP ACTU VLV HV-8000A NOT FULL OPEN (ALB 12 E06),

2 B COLD OP ACTU VLV HV-8000B NOT FULL OPEN (ALB 12 F06).

(f) ENSURE PRZR PORVs PV-455A and 456A are closed and the handswitches in AUTO, _____

(g) ENSURE OPEN PRZR PORV BLOCK valves HV-8000A and HV-8000B. _____

NOTE

This step satisfies Technical Specification surveillance requirement 4.4.9.3.1.c.

(h) VERIFY the following annunciators reset:

1 A COLD OP ACTU VLV HV-8000A NOT FULL OPEN (ALB 12 E06), _____

2 B COLD OP ACTU VLV HV-8000B NOT FULL OPEN (ALB 12 F06). _____

b. VERIFY SAFETY INJECTION Pumps A and B breakers are racked out and tagged per 12006, "Unit Cooldown To Cold Shutdown". _____

UNIT NO. _____ INITIALS

4.1.5 While operating with the RCS level below 17% pressurizer level (approximately 207 feet elevation) the following controls should be in effect:

a. Tygon tube watch is required any time the RCS level is being changed while the RCS level is below 17% (approximately 207 feet elevation) pressurizer level,

(1) Periodic comparison checks should be made every 4 hours between the Control Room Temporary RCS Level Monitors and the Tygon tube,

(2) The Control Room Monitors should agree within 7 percent of scale with the Tygon tube,

(3) Two out of three Level Monitors must agree before draining RCS below the top of the hot leg (188 feet 3 inches),

(4) If neither Control Room RCS Level Monitor is available, then a continuous Tygon tube watch should be established while RCS level is below 17% pressurizer level.

(5) DETERMINE closure status of Containment Equipment Hatch and ENSURE hatch is capable of being closed within 57 minutes or ENSURE hatch is closed prior to reducing RCS level below three feet below the Reactor Vessel Flange (191 ft. el.),

(6) A review of all Containment penetrations addressed in 14210, "Containment Building Penetrations - Refueling" should be accomplished to determine those which have been opened by manual means and an info LCO generated for those identified,

UNIT NO. _____ INITIALS

(7) Except when installing the Reactor Vessel Head, a minimum of two incore thermocouples shall be available, _____

(8) REQUEST I&C reset the designated ERF incore thermocouples alarm setpoint to alarm at 10°F above desired temperature per 00410-C, "Computer Software Control", _____

(9) If SG Nozzle Dams are to be installed and no cold leg opening is to be established, a vent path is required from the Reactor Vessel upper plenum.

This vent path can be satisfied by:

(a) Removing a pressurizer manway, or

(b) Removing a Steam Generator manway on a hot leg that will not be dammed, or

(c) Removing three pressurizer code safeties. _____

(10) If SG Nozzle Dams are to be installed and a cold leg opening is to be established, a vent path is required from the Reactor Vessel Upper Plenum by removing an SG manway on an HL that will not be dammed.

(11) If it is intended to operate at one foot above mid-nozzle level, the preferred RHR configuration is one train operating with a flow of 3000 gpm, _____

UNIT NO. _____ INITIALS

(12) While operating with SG Nozzle Dams installed, ENSURE one Safety Injection Pump is capable of being racked in and operated in the hot leg injection mode if needed,

(13) While level is in the region of the hot legs, TREND RHR Pump parameters on ERF for early detection of possible RHR Pump degradation due to vortexing,

(14) Minimum RCS level is one foot above mid-nozzle (188 feet 0 inches elevation) except for Steam Generator burping during initial drain down. For effective SG tube draining, RCS level should be lowered to 187 feet 6 inches. Upon completion of SG burping, RAISE RCS level to 188 feet - 0 inches and MAINTAIN at this level thereafter.

(15) A minimum of 4 Containment Cooling Units will be operable and capable of being started if required while RCS level is below 191 feet elevation.

b. COORDINATE with Outage Area Supervisor and INITIATE draining the Refueling Cavity to 190 feet per 13011, "Residual Heat Removal System", _____

DE-ENERGIZE all underwater lights prior to uncovering. _____

4.1.6 When the Reactor Vessel Head is ready to be lowered into place, VERIFY RCS water level is less than or equal to 190 feet. _____

UNIT NO. _____ INITIALS

4.1.7 Prior to lowering Reactor Vessel Head into place, DRAIN Reactor Cavity Seal Area by opening Reactor Cavity Seal Support Drain.

UNIT 1: 1-1213-U4-088 _____

_____ IV

UNIT 2: 2-1213-U4-088 _____

_____ IV

4.1.8 If it is necessary to perform any head lifts for O-ring inspections, deconning, etc., then prior to performing the lift, COMPLETE the applicable steps of 12007-C, "Refueling Entry" Core Alternations Checklist 2 and ATTACH to this procedure. _____

4.1.9 After the Reactor Vessel Head is lowered into place and during Head tensioning, MAINTAIN RCS water level at less than or equal to 190 feet. _____

4.1.10 If necessary, INITIATE reducing level to 1 foot above mid-nozzle (188 feet - 0 inches) or 189 feet with SG Nozzle Dams installed.

4.1.11 MAINTAIN RCS temperature utilizing RHR Outlet HV-0606 for Train A (HV-0607 for Train B) as high as possible but not to exceed 130°F. _____

UNIT NO. _____ INITIALS

4.1.12 NOTIFY Health Physics that they may release the locked or posted access restrictions on the concrete plugs for the Fuel Transfer Tube bellows in the Fuel Handling Building and Containment Building. _____

4.1.13 Upon completion of refueling cavity decontamination activities:

a. ENSURE Maintenance removes the 2 Blind Flanges on the 12 inch drain lines in the Refueling Cavity. _____

_____ IV

b. ENSURE Maintenance has installed the Transfer Tube Blind Flange. (Technical Specification 4.6.1.1.a) _____

_____ IV

c. ENSURE the FHB HVAC Pre-heating Coil Thermostat is reset by verifying local handswitches HS-12470 and 12471 are in the OFF position. _____

d. CLOSE Reactor Cavity Seal Support Drain.

UNIT 1: 1-1213-U4-088 _____

_____ IV

UNIT 2: 2-1213-U4-088 _____

_____ IV

UNIT NO. _____ INITIALS

4.2 MODE 5 ENTRY

4.2.1 Prior to Maintenance completing the last head bolt tensioning (Mode 5 entry) PERFORM the following:

a. COMPLETE the following logs and VERIFY the requirements therein are met for entry into Mode 5:

(1) 14000, "Operations Shift And Daily Surveillance Logs". _____*

OBTAIN the new cycle curves for the Plant Technical Data Book from Reactor Engineering to be used for shutdown margin determinations.

If curves are not available, OBTAIN a method of performing shutdown margin determinations from Reactor Engineering.

(2) 14225, "Operations Weekly Surveillance Logs", _____*

(3) 14228, "Operations Monthly Surveillance Logs", _____*

(4) 14915, "Special Condition Surveillance Logs. _____*

b. REVIEW the following for impact on entering Mode 5:

(1) Jumper and Lifted Wire Log, _____

(2) Temporary Modification Log, _____

(3) Equipment Clearance Log, _____

(4) LCO Book, _____

(5) Outstanding Work Orders. _____

UNIT NO. _____ INITIALS

c. ENSURE that all surveillance test procedures scheduled per Sub-subsection 4.1.2 required for Mode 5 entry have been completed. _____

REVIEW the Control Room Mode change Binder or OBTAIN from the Surveillance Tracking Coordinator.

d. INITIATE Mode 5 log sheet readings per 14000, "Operations Shift And Daily Surveillance Logs", _____

e. OBTAIN On-Shift Operations Supervisor's approval to change status from Mode 6 to Mode 5.

_____ / / _____
OSOS Signature Date Time

4.2.2 When notified by Maintenance Department that the last Reactor Vessel Head Bolt is tensioned, LOG Mode 5 entry into the Unit Control Log Book. _____

4.2.3 This procedure is complete; REFER to 12001-C, "Unit Heatup To Hot Shutdown (Mode 5 to Mode 4).

Completed: _____
Signature Time / Date

Reviewed: _____
Signature Time / Date

Comments: _____

_____

5.0 REFERENCES

5.1 PROCEDURES

5.1.1	12001-C	"Unit Heatup To Hot Shutdown (Mode 5 To Mode 4)
5.1.2	12006-C	"Unit Cooldown To Cold Shutdown"
5.1.3	13005	"Reactor Coolant System Draining"
5.1.4	13011	"Residual Heat Removal System"
5.1.5	13715	"Component Cooling Water System"
5.1.6	13719	"Spent Fuel Pool Cooling And Purification System"
5.1.7	14000	"Operations Shift And Daily Surveillance Logs"
5.1.8	14210	"Containment Building Penetrations Verification-Refueling"
5.1.9	14225	"Operations Weekly Surveillance Logs"
5.1.10	14228	"Operations Monthly Surveillance Logs"
5.1.11	14915	"Special Condition Surveillance Logs"
5.1.12	24518	"Reactor Coolant Pressure (Wide Range) Protection II P-403 Analog Channel Operational Test And Channel Calibration"
5.1.13	24519	"Reactor Coolant Pressure (Wide Range) Protection I P-405 Analog Channel Operational Test And Channel Calibration"

END OF PROCEDURE TEXT

UNIT NO.: _____ DATE 1 1

UNIT COOLDOWN TO COLD SHUTDOWN

05-78-90

1.0 PURPOSE

This procedure provides instructions for maintaining hot standby following reactor trip, maintaining hot standby following reactor shutdown, taking the unit from hot standby to cold shutdown. Instructions are provided for maintaining conditions stable at points between.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

2.1.1 If this procedure is terminated prior to completion, the Unit Shift Supervisor (USS) should note the reason for the termination in the comments section.

2.1.2 The Reactor Coolant System (RCS) pressure and temperature shall be maintained within the operating region of RCS Pressure Temperature Limits (Plant Technical Data Book Tab 3.1).

2.1.3 Do not add positive reactivity by more than one controlled method at a time while the reactor is subcritical.

2.1.4 Whenever RCS temperature is above 160°F, at least one RCP should be in operation. Preferably Pump 4 to ensure best spray capability.

2.1.5 Prior to opening any portion of the RCS to the atmosphere, the hydrogen concentration in the affected portion must be reduced to less than 5cc/kg.

2.1.6 The boron concentration in the pressurizer should not be different from the RCS by more than 50 ppm. Pressurizer Backup Heaters may be energized as necessary to equalize the boron concentration.

2.1.7 The Control Rod Drive Mechanism (CRDM) Cooling System shall be operating when RCS temperature is greater than or equal to 350°F or when any CRDM is energized.

2.1.8 During cooldown, all Main Steam Isolation Valves (MSIVs) should be open or atmospheric reliefs balanced to allow uniform cooldown of all Reactor Coolant System (RCS) loops and Steam Generators (SGs). Steam dump is the preferred method of heat removal.

2.1.9 The Residual Heat Removal (RHR) Pump Suction Line should not be isolated from the RCS unless there is a steam bubble in the Pressurizer.

2.1.10 One Reactor Coolant Pump (RCP) should be running anytime RCS temperature is changed by more than 10°F in one hour.

2.1.11 Spray flow into the Pressurizer should not be initiated if the temperature difference between the Pressurizer steam space and the spray fluid exceeds 125°F.

2.1.12 Before auxiliary spray is initiated with a temperature difference between the pressurizer steam space and the spray fluid exceeding 320°F, notify the USS. (Technical Specification 5.7.1)

2.1.13 While in Hot Standby, feeding Steam Generators should be continuous to minimize thermal stresses on the Feedwater Nozzle.

2.1.14 Vacuum should be maintained on the Main Turbine following unit shutdown until the Turbine coasts down to approximately 66% rated speed (1200 rpm) unless an emergency dictates rapid coastdown of the Turbine Rotor.

2.1.15 If Main Turbine coastdown is in progress, then coastdown parameters should be monitored per 13800, "Main Turbine Operation" Sub-subsection 4.3.2.

2.1.16 The Main Turbine should be kept on Turning Gear until metal casing temperatures have returned to ambient. Bearing lube oil circulation must also be maintained.

2.1.17 During periods of operation with the RCS level below the Reactor Vessel Flange elevation (194 feet elevation), ongoing work activities should be closely scrutinized and any work activity limited that has the potential for reducing RHRS capability.

2.2 LIMITATIONS

2.2.1 The RCS pressure and temperature shall not exceed 425 psig and 350°F when open to the RHR system.

2.2.2 While in Modes 3 and 4, shutdown margin shall be greater than or equal to the limit specified in Technical Specification 3.1.1.2, Figure 3.1-1.

2.2.3 While in Mode 5, shutdown margin shall be greater than or equal to the limit specified in Technical Specification 3.1.1.2, Figure 3.1-2.

2.2.4 While in Mode 3, at least two RCS loops shall be in operation with the Reactor Trip Breakers closed and at least one in operation with the Reactor Trip Breakers open. (Technical Specifications 3.4.1.2)

2.2.5 While in Mode 4, at least two RCS loops and/or RHR trains shall be operable and at least one of the RCS loops and/or RHR trains shall be in operation. (Technical Specifications 3.4.1.3)

2.2.6 While in Mode 5 with the RCS loops filled, at least one RHR train shall be operable and in operation and either one additional RHR train operable or the secondary side water level of at least two steam generators shall be greater than 17% wide range. (Technical Specification 3.4.1.4.1)

2.2.7 While in Mode 5 with the RCS loops not filled, at least two RHR trains shall be operable and at least one RHR train shall be in operation. Reactor Makeup Water Valves 1208-U4-175, 1208-U4-176, 1208-U4-177, and 1208-U4-183 shall be closed and secured in position (by mechanical stops), except 1208-U4-176 and 1208-U4-177 may be opened for short periods of time for chemistry control provided the Hi Flux at Shutdown Alarm is operable with a setpoint of less than or equal to 2.30 times background. (Technical Specification 3.4.1.4.2)

2.2.8 While in Modes 4, 5, and 6 with the Reactor Vessel Head on, at least one of the following cold overpressure protection systems shall be operable:

a. Two PORVs with lift settings which do not exceed the limits established in Figure 1,

b. Two RHR suction Relief Valves each with a setpoint of 450 psig ±3%, or

c. The RCS depressurized with an RCS vent capable of relieving at least 670 gpm water flow at 470 psig. (Technical Specification 3.4.9.3)

2.2.9 While in Modes 5 and 6, at least one Charging Pump in the required boron injection flow path shall be operable. (Technical Specification 3.1.2.3)

2.2.10 The primary to secondary pressure differential shall not exceed 1600 psid or a secondary to primary pressure differential of 670 psid during unit operations or leak tests.

2.2.11 The maximum cooldown of the RCS shall be limited to 100°F in any one hour period. (Technical Specification 3.4.9.1)

2.2.12 The maximum cooldown of the pressurizer shall be limited to 200°F in any one hour period. (Technical Specification 3.4.9.2)

2.2.13 The maximum temperature differential between auxiliary spray water and pressurizer steam space is 625°F. (Technical Specification 3.4.9.2)

2.2.14 The temperature of both the primary and secondary coolant in the Steam Generators shall be greater than 70°F when the pressure of either coolant in the Steam Generator is greater than 200 psig. (Technical Specification 3.7.2)

2.2.15 While in Modes 3, 4 and 5, both channels of Source Range Nuclear Instrumentation shall be operable. (Technical Specifications Table 3.3-1, 6.B)

2.2.16 While in Modes 3, 4, and 5 at least one channel Source Range Nuclear Instrumentation should be selected to Recorder NR-45 and the CONTROL ROOM HI FLUX LEVEL AT SHUTDOWN alarm operable.

2.2.17 While in Modes 5 and 6, with the RCS level below Reactor Vessel Flange elevation (194 feet elevation), the RWST will be operable with a minimum volume of 99,404 gallons (9% of instrument span) of water at a boron concentration between 2400 and 2600 ppm.

3.0 INITIAL CONDITIONS

3.1 The reactor is shut down either following normal shutdown or reactor trip with Shutdown Rods either withdrawn or inserted.

3.2 RCS temperature is stabilized at no load Tavg under control of the steam dumps in Steam Pressure mode or by operation of the Steam Generator Atmospheric Relief Valves.

3.3 RCS pressure is stable at normal operating pressure.

3.4 At least one RCP is operating.

3.5 Pressurizer level is at approximately or returning to the program level with either the Positive Displacement (PD) Pump or a Centrifugal Charging Pump (CCP) operating to supply normal charging and RCP seal injection flow.

3.6 SG levels are at 45% to 55% NR level with Auxiliary Feedwater (AFW) operating.

3.7 The main Turbine is tripped and either coasting down or on the Turning Gear.

4.0 INSTRUCTIONS

NOTES

a. This procedure is divided into sections which permit either cooldown or maintaining stable conditions within a specified mode. Section E may be performed concurrently with Sections A,B,C,D

b. Asterisk (*) steps beside INITIAL steps indicate steps that generate additional documents.

c. This procedure is written using Train A designations. Train B component designations are shown in parenthesis.

The sections of this procedure are:

A. Hot Standby Following Reactor Shutdown or Trip.

B. Cooldown to not less than 350°F.

C. Cooldown to not less than 205°F.

D. Cooldown to Cold Shutdown (less than 200°F).

E. Secondary Plant Shutdown.

UNIT NO. _____

SECTION A: Hot Standby Following Reactor Shutdown or Trip

A4.1 OPERATING IN HOT STANDBY FOLLOWING REACTOR SHUTDOWN OR TRIP:

INITIALS

A4.1.1 If this procedure has been entered from a reactor trip, then perform the following:

a. INITIATE 10006-C, "Reactor Trip Review", _____*

b. If entering this procedure from SI termination, then perform 11886, "Recovery From ESF Actuation", _____

c. MONITOR Main Turbine coastdown parameters per 13800, "Main Turbine Operation" and:

(1) ENSURE that the Turning Gear Motor Control Handswitch is in AUTO/PULL-TO-LOCK position, _____

(2) When Turbine Rotor reaches zero speed, VERIFY all Lift Pumps, Turning Gear Oil Pumps ON and Turning Gear engagement. _____

d. If applicable, ENSURE that TDAFW Pump has been stopped per 13610, "Auxiliary Feedwater System" and returned to STANDBY per 13610, Checklist 2, _____*

e. If not performed in the previous 92 days, COMPLETE 14423, "Source Range NIS Channel Analog Operational Test" (Technical Specification Table 4.3.1 item 6), _____*

UNIT NO. _____ INITIALS

f. When Source Range channels indication stabilize PLACE CONTROL ROOM HI FLUX LEVEL AT SHUTDOWN alarm in operation by performing the following:

(1) NOTIFY I&C and if necessary, RESET the HI FLUX AT SHUTDOWN alarm setpoint per 24695 and 24696, "N.I. System Source Range Channel Calibration", _____

(2) ENABLE THE HI FLUX AT SHUTDOWN alarm by placing the HIGH FLUX AT SHUTDOWN NORMAL/BLOCK switches to the NORMAL, _____

(3) VERIFY annunciator SOURCE RNG HI SHUTDOWN FLUX ALARM BLOCKED ALB-10 B01 resets, _____

(4) SELECT both channels of Source Range indication on Recorder NR-45, _____

ANNOTATE chart to reflect channels selected,

g. CALCULATE SHUTDOWN MARGIN per 14005, "Shutdown Margin Calculations", _____*

h. If necessary, BORATE the RCS per 13009, "CVCS Reactor Makeup Control System", _____

i. SHUT DOWN the CVCS BTRS System by performing the following:

(1) PLACE the CVCS BTRS SELECTOR Switch HS-10351 in the OFF position, _____

(2) CLOSE the BTRS Demineralizer Flow Control HV-0387 to the FULLY CLOSED position, _____

UNIT NO. _____ INITIALS

j. DIRECT Chemistry to sample the RCS hydrogen, gas activity concentrations and PERFORM an RCS Iodine sample analysis per the required frequencies of Technical Specifications Table 4.4-4, _____

Person Contacted _____ Date _____ Time _____

k. MAXIMIZE CVCS letdown purification flow rate per 13006, "Chemical And Volume Control System Startup And Normal Operation", _____

_____ / _____
Date Time

l. If required, INITIATE STARTUP of the Auxiliary Boiler per 13760-C, "Auxiliary Steam Boiler System", _____

NOTIFY Chemistry Department,

m. At the Steam Generator Blowdown Panel, slowly LOWER Steam Generator Cooling Water To The Heater Drain Tank temperature to 200°F by adjusting the setpoints on the Steam Generator Blowdown temperature Control Valves Controllers TIC-1191, 1192, 1193 and 1194, _____

n. STOP both Heater Drain Pumps, _____

o. STOP all but one Condensate Pump, _____

p. REDUCE in-service Condensate Demineralizer Powdex Vessels as applicable per 13616, "Condensate Filter Demineralizer System",

UNIT NO. _____ INITIALS

q. PLACE the Condensate and Feedwater System on Long cycle recirc per 13615, "Condensate And Feedwater Systems", or if a return to power is anticipated, OPEN MFP A & B BYPASS:

UNIT 1: 1-1305-U4-655

UNIT 2: 2-1305-U4-655

or at least one MFP Discharge MOV and VERIFY condensate/feedwater chemistry is acceptable for feeding Steam Generators by obtaining concurrence from Chemistry Department, _____

r. NOTIFY Chemistry to initiate placing condensate and feedwater into proper chemical wet layup, _____

s. If necessary, SHUT DOWN all but one Circulating Water Pump, _____

t. If necessary, SHUT DOWN all but one River Makeup Pump and RECORD time in the Unit Control Log Book, _____

u. ENSURE SG Blowdown Isolation Valves 1-HV-7603A(B, C, D) open. _____

A4.1.2 If No-Load Tavg cannot be maintained due to excessive steam demand, REDUCE steam demand by performing the following:

a. ENSURE MSR Heating Steam Supply Valves HS-6015 and HS-6030 closed, _____

b. TRANSFER the Auxiliary Steam System steam supply to the Auxiliary Boiler per 13761, "Auxiliary Steam System", _____

c. TRANSFER the Turbine Steam Seal supply to the Auxiliary Steam Supply per 13825, "Turbine Steam Seal System", _____

d. TRANSFER the SJAE steam supply to the Auxiliary Steam Supply per 13620, "Condenser Air Ejection System", _____

UNIT NO. _____ INITIALS

e. If Main Generator is to be shut down for more than two days, then to prevent overheating relay 360A, OPEN links TBR 28, 29 and 30, located in Protective Relay Panel Bay 4, per 00306-C, "Temporary Jumper And Lifted Wire Control", _____

f. If the Generator Regulator Panel (1328-P5-GRC) is to be de-energized for maintenance, then OPEN links TBR 56 and 57 and TBS 4 and 5 located in Protective Relay Panel Bay 4, per 00306-C, "Temporary Jumper and Lifted Wire Control". This will prevent tripping Lockout Relays 386 G9 and 386 G10 which trip Generator Output Breakers, _____

g. At the Main Transformer Control Cabinets, de-energize the Transformer Oil Pumps and Fans per 13800, "Main Turbine Operation" Sub-subsection 4.3.1. _____

A4.1.3 At the USS's discretion, DISABLE the MFPT trip circuitry to AFWAS by removing and tagging the following fuses on the applicable unit:

UNIT 1: Train A - Aux Relay Panel 1NCPAR2, Fuse FU-4 _____

_____ IV

Train B - Aux Relay Panel 1NCPAR4, Fuse FU-1 _____

_____ IV

UNIT 2: Train A - Aux Relay Panel 2NCPAR2, Fuse FU-4 _____

_____ IV

Train B - Aux Relay Panel 2NCPAR4, Fuse FU-1 _____

_____ IV

UNIT NO. _____.

INITIALS

A4.1.4 Either OPERATE unit systems as necessary to maintain the unit at Hot Standby, or PROCEED to either Section B to initiate unit cooldown or 12003-C, "Reactor Startup" to return to power.

END OF SECTION A

UNIT NO. _____

SECTION B: Cooldown to not less than 350° F

NOTE

This section directs cooldown to 375°F or any point between without crossing the boundary for Mode 4 at 350°F.

B4.1 PREPARATION FOR UNIT COOLDOWN

INITIALS

B4.1.1 If required to cooldown secondary systems, then INITIATE Section E of this procedure.

B4.1.2 If Condenser vacuum is being maintained, then INITIATE placing a steam blanket on the MSR's per 13800, "Main Turbine Operation". _____

B4.1.3 INITIATE pressurizer and RCS boron equalization by energizing Pressurizer Backup Heaters. _____

B4.1.4 MAXIMIZE CVCS letdown purification flowrate.

_____
date/time _____

B4.1.5 INITIATE Borating the RCS to the cold shutdown boron concentration per 13009, "CVCS Reactor Makeup Control System". _____

If applicable, PERFORM 14835, "Boric Acid Injection Check Valve Cold Shutdown Inservice Test" during the boration. _____*

B4.1.6 DIRECT Chemistry to sample the RCS and Pressurizer boron concentration. _____

B4.1.7 If withdrawn, INSERT all Shutdown Banks to the fully inserted position. _____

B4.1.8 OPEN the Reactor Trip breakers. _____

UNIT NO. _____ INITIALS

B4.1.9 If not currently in progress, INITIATE RCS gaseous activity degas by performing the following:

a. ENSURE that the Pressurizer Steam Space Sample line is in operation by verifying that the PRZR STM SAMPLE IRC/ORC Valves HV-3513/HV-3514 are open, _____

b. NOTIFY Chemistry to adjust the pressurizer steam space sample flow rate to maximum, _____

c. While maintaining hydrogen cover gas, DEGAS the RCS by raising VCT gas purge flow rate to the Gaseous Waste Processing System to approximately 1.2 scfm using HIC-1094, as limited by the Hydrogen Recombiners. _____

B4.1.10 When notified by Chemistry that the RCS gaseous activity has been reduced to an acceptable level, TRANSFER VCT cover gas to Nitrogen and INITIATE RCS Hydrogen degas per 13007, "VCT Gas Control And RCS Chemical Addition". _____

NOTE

Prior to opening the RCS to containment the hydrogen concentration shall be less than 5 cc/kg.

B4.1.11 START both Containment Pre-access Filter Units using CTB PREACCESS FLTR UNIT-1/2 FAN HS-2620/2621.

_____ _____
date/time

B4.1.12 If it is planned to cool down to Cold Shutdown, and if not performed in the previous three months, COMPLETE 14748, "AFW Check Valve Shutdown Inservice Test". _____ *

UNIT NO. ____ INITIALS

B4.2 RCS COOLDOWN TO 375°F

B4.2.1 COMMENCE RCS/Pressurizer pressure and temperature trending at 30 minute intervals using Data Sheet 1 and ERF computer. (Technical Specification 4.4.9.1, 4.4.9.2)

Data taking and plotting may be suspended during holds in the cooldown if the duration is expected to exceed one hour.

CAUTION

To reduce thermal stratification in the Pressurizer Surge Line maintain the Delta-T between the RCS and the Pressurizer Steam Space as low as practical. The Delta-T of 320°F should not be exceeded.

NOTE

It is recommended that the RCS temperature be maintained 100°F ±25°F below Pressurizer steam space temperature. (See Figure 1.)

B4.2.2 COMMENCE the cooldown to 375°F and 540 psig at a recommended rate of approximately 50°F per hour by performing the following:

a. REDUCE the number of operating RCPs to two per 13003, "Reactor Coolant Pump Operation", _____

Pumps 4 and 1 are the preferred running pumps,

b. INITIATE Pressurizer cooldown and depressurization by slowly opening the Pressurizer Spray Valves, _____

If necessary, selectively DE-ENERGIZE Pressurizer Back-up Heaters by placing Control Switches to PULL-TO-LOCK,

UNIT NO. _____ INITIALS

CAUTION

RCS temperature and pressure shall be maintained within the acceptable operating region of Figure 1.

c. Slowly ADJUST the Steam Dump Controller setpoint or if applicable the Atmospheric Relief Valves to initiate RCS cooldown. _____

B4.2.3 At approximately 2185 psig, OBSERVE PRZR PORV BLOCK VALVES HV-8000A and HV-8000B auto close. _____

NOTE

Depending on the rate of RCS cooldown and depressurization, Step B4.2.5 may occur before Step B4.2.4.

B4.2.4 At approximately 550°F RCS temperature PERFORM the following:

a. VERIFY status light LO LO TAVG TRAIN A STEAM DUMP INTL P12 illuminated, _____

b. BYPASS the LO LO TAVG interlock by momentarily placing the Train A and B Steam Dump Interlock Selector Switches to the BYPASS INTERLOCK position, _____

If operating on Steam Dumps, then VERIFY Steam Dump Cooldown Valves PV-0507A,B and C are open by observing ZLB-2 on QMCB. _____

UNIT NO. _____ INITIALS

CAUTION

If the RCS is allowed to pressurize above P11 and SG pressure is below 585 psig, Safety Injection and Steam Line Isolation will occur.

B4.2.5 At approximately 1970 psig, manually BLOCK Pressurizer Pressure and Steam Line Pressure Safety Injection and Steam Line Pressure Steam Line Isolation signals by performing the following:

a. It is is planned to cool down for refueling, then PERFORM 14710, "Remote Shutdown Panel Transfer Switch And Control Circuit 18 Month Surveillance Test" Data Sheets 3A and 3B in lieu of the following substeps, _____

b. VERIFY Block Permissive Status Light PRZR LO PRESS SI BLOCK PERM P11 illuminates, _____

c. BLOCK the Low Pressurizer Pressure Safety Injection signal using PRZR PRESS SI BLOCK/RESET A and B handswitches HS-40012 and 40013, _____

d. OBSERVE Status Lights PRZR TRAIN A/B SI BLOCKED illuminated, _____

e. BLOCK the Low Steam Line Fressure Safety Injection signal using LOW STM PRESS SI/SLI BLOCK RESET handswitches HS-40068 and 40069, _____

f. OBSERVE Status Lights STMLINE ISO TRAIN A/B SI BLOCKED illuminated. _____

B4.2.6 CHECK that Pressurizer level is between 20% and 40%. _____

B4.2.7 As RCS pressure lowers, OPEN additional Letdown Orifice Isolation Valves and ADJUST PIC-131 setpoint to maintain desired letdown flowrate.

B4.2.8 During RCS depressurization, MAINTAIN all RCP seal injection flow rates between 8 and 13 gpm by adjusting the Charging Header Flow Controller HC-0182.

UNIT NO. _____ INITIALS

B4.2.9 At approximately 950 psig, ISOLATE ECCS Accumulators by performing the following:

a. REMOVE TAG, UNLOCK and CLOSE the Accumulator Discharge Isolation Valve 480V MCC Breakers on the applicable unit:

UNIT 1

ACCUM-1	1ABE-19	_____
ACCUM-2	1BBC-19	_____
ACCUM-3	1ABC-19	_____
ACCUM-4	1BBE-19	_____

UNIT 2

ACCUM-1	2ABE-19	_____
ACCUM-2	2BBC-19	_____
ACCUM-3	2ABC-19	_____
ACCUM-4	2BBE-19	_____

b. CLOSE the Accumulator Isolation Valves,

ACCUM-1 HV-8808A,	_____
ACCUM-2 HV-8808B,	_____
ACCUM-3 HV-8808C,	_____
ACCUM-4 HV-8808D.	_____

c. OPEN, LOCK and TAG the Accumulator Discharge Isolation Valves 480V MCC Breakers on the applicable unit,

UNIT 1

ACCUM-1	1ABE-19	_____
		_____ IV
ACCUM-2	1BBC-19	_____
		_____ IV
ACCUM-3	1ABC-19	_____
		_____ IV
ACCUM-4	1BBE-19	_____
		_____ IV

UNIT NO. _____ INITIALS

UNIT 2

ACCUM-1	2ABE-19	_____
		IV
ACCUM-2	2BBC-19	_____
		IV
ACCUM-3	2ABC-19	_____
		IV
ACCUM-4	2BBE-19	_____
		IV

d. OPEN and TAG MCC Relay K2 Links for the above MCC breakers. _____

B4.2.10 When steam pressure falls too less than 550 psig, at the USS's discretion the Steam Generators may be supplied by the running Condensate Pump per Section E4.2 of this procedure.

B4.2.11 Either OPERATE unit systems as necessary to maintain RCS within the following parameter values or PROCEED to either Section C to continue the cooldown or 12002-C, "Unit Heatup to Normal Operating Temperature and Pressure" to commence a heatup.

RCS temperature	375°F ±10°F
RCS pressure	540 psig ±25 psig
Pressurizer level	at program level

END OF SECTION B

SECTION C: Cooldown to not less than 205°F

NOTE

This section directs cooldown to 225°F or any point between without crossing the boundary for Mode 5.

C4.1 PREPARATION FOR CONTINUING UNIT COOLDOWN.

INITIALS

C4.1.1 If required to cooldown secondary systems and break condenser vacuum, then INITIATE SECTION E of this procedure.

CAUTION

Maintain pressurizer cold calibration level greater than 17%.

C4.1.2 If it is planned to cool down to cold shutdown, then ALLOW pressurizer level to rise to approximately 65% during the cooldown but not greater than 80% cold calibrate.

CAUTION

To reduce thermal stratification in the Pressurizer Surge Line maintain the Delta-T between the RCS and the Pressurizer Steam Space as low as practical. The Delta-T of 320°F should not be exceeded.

C4.1.3 COMMENCE RCS/Pressurizer pressure and temperature trending at 30 minutes intervals using Data Sheet 1 and ERF computer. (Technical Specification 4.4.9.1, 4.4.9.2)

Plotting may be suspended during holds in the cooldown if the duration is expected to exceed one hour.

UNIT NO. _____ INITIALS

C4.2 RCS COOLDOWN TO 225°F.

NOTE

It is recommended that the RCS temperature be maintained 100°F ±25°F below Pressurizer steam space temperature. (See Figure 1.)

C4.2.1 COMMENCE the cooldown to 225°F and 250 psig at a recommended rate of approximately 50°F per hour by performing the following:

a. CONTINUE the pressurizer cooldown and depressurization by slowly opening the Pressurizer Spray Valves, _____

If necessary, selectively DE-ENERGIZE Pressurizer Backup Heaters by placing Control Switches to PULL-TO-LOCK,

CAUTION

RCS temperature and pressure shall be maintained within the acceptable operating region of Figure 1.

b. Slowly ADJUST the Steam Dump Controller Setpoint or if applicable the Atmospheric Relief Valves to initiate RCS cooldown. _____

C4.2.2 If it is planned to cool down for refueling, then prior to reaching 350°F, REQUEST confirmation from Engineering/Maintenance that actions have been taken to preclude Reactor Vessel Seismic Tie Rod Binding. _____

C4.2.3 Prior to reaching 350°F, ISOLATE PERMS CVCS Letdown Monitor RE-48000. _____

UNIT NO. _____ INITIALS

C4.2.4 Prior to reaching 350°F, PLACE the Cold Overpressure Protection System (COPS) in operation by performing the following:

a. If not performed in the previous three months, PERFORM 14860, "PORV Cold Shutdown Inservice Test", _____*

b. ARM the A and B COPS by placing the PRZR PORV BLOCK VLV COLD OVERPRESSURE CNTL handswitches HS-8000G and 8000H to the ARM position, _____

c. VERIFY the following annunciators alarmed upon arming COMS:

A COLD OP ACTU VLV HV-8000A NOT FULL OPEN (ALB12 E06), _____

B COLD OP ACTU VLV HV-8000B NOT FULL OPEN (ALB12 F06), _____

d. ENSURE PRZR PORV PV-455A and 1-PV-456A are closed and the handswitches in AUTO, _____

e. ENSURE OPEN PRZR PORV BLOCK Valves HV-8000A and 8000B, _____

NOTE

Step f satisfies Technical Specification surveillance 4.4.9.3.1.c

f. VERIFY the following annunciators reset:

A COLD OP ACTU VLV HV-8000A NOT FULL OPEN (ALB12 E06), _____

B COLD OP ACTU VLV HV-8000B NOT FULL OPEN (ALB12 F06). _____

C4.2.5 At 350°F, LOG time and date of entry into Mode 4 in the Unit Control Log Book.

_____ _____
date/time

UNIT NO. _____ INITIALS

C4.2.6 Within 4 hours after entering Mode 4 and prior to reaching 325°F PERFORM the following:

a. RACK OUT and TAG both safety Injection Pump Breakers on the applicable unit, (Technical Specification 4.5.3.2)

UNIT 1: SI PMP-A 1AA02-16 _____

IV _____

SI PMP-B 1BA03-17 _____

IV _____

UNIT 2: SI PMP-A 2AA02-16 _____

IV _____

SI PMP-B 2BA03-17 _____

IV _____

UNIT NO. _____ INITIALS

NOTE

AFWAS should be defeated to the SG Blowdown Valves, Sample Valves and MDAFW Pump Discharge Valves to accommodate MFP activities and/or SG draining/filling operations without resulting in impacting those activities.

b. At the USS's discretion, REMOVE and TAG the following fuses on the applicable unit:

UNIT 1: Train A - Aux Relay Panel 1ACPAR6, Fuse FU-2 _____

_____ IV

Train B - Aux Relay Panel 1BCPAR7, Fuse FU-6 _____

_____ IV

UNIT 2: Train A - Aux Relay Panel 2ACPAR6, Fuse FU-2 _____

_____ IV

Train B - Aux Relay Panel 2BCPAR7, Fuse FU-6 _____

_____ IV

c. PLACE standby MDAFW Pumps handswitch in PULL-TO-LOCK, _____

d. If the TDAFW Pump is not being utilized, CLOSE HV-5122, 5125, 5127 and 5120. _____

UNIT NO. _____ INITIALS

C4.2.7 When the RCS pressure is less than 365 psig, and RCS temperature is less than 340°F, PLACE at least one RHR Train in operation per 13011, "Residual Heat Removal System". _____

a. OPERATE RHR HX Outlet Valves HV-0606(0607) and Bypass Valves FV-0618(0619) to control RCS temperature as necessary and RHR flow at a minimum total flow of 3000 gpm,

b. If applicable, PERFORM 14896, "ECCS Check Valve Cold Shutdown Inservice Test", _____*

c. ENSURE RHR Suction Isolation surveillance is initiated each shift per 14000, "Shift And Daily Surveillance Logs". _____

CAUTION

While in Mode 5 with the Reactor Coolant Loops filled, with 1 RHR Train inoperable, the secondary side water level of at least two Steam Generators shall be greater than 17% WR.

C4.2.8 If desired, REDUCE the number of operating RCPs to one per 13003, "Reactor Coolant Pump Operation". _____

Pump 4 is the preferred running pump to ensure best spray capability.

C4.2.9 When SG pressure falls to 25 psig INITIATE aligning Nitrogen to the SG's per 13601, "Steam Generator And Main Steam System Operation" with regulators set at 2 to 5 psig.

C4.2.10 If it is intended to perform maintenance on the RAT's during the outage, then NOTIFY Maintenance to initiate work towards backfeeding through the Main Transformer and UAT's per 13417, "Main And Unit Auxiliary Transformer Backfeed To The 13.8kV And 4160V Non-1E Busses". _____

INITIALS

C4.2.11 Either OPERATE unit systems as necessary to maintain RCS within the following parameter values or PROCEED to either Section D to continue the cooldown or 12001-C, "Unit Heatup to Hot Shutdown" to commence a heatup.

CAUTION

Ensure running RCP seal differential pressure is maintained greater than 200 psid.

RCS temperature	225 F ±10°F
RCS pressure	250 psig ±25 psig

END OF SECTION C

UNIT NO. _____

SECTION D: Cooldown to Cold Shutdown (less than 200°F).

NOTE

This section directs cooldown to Mode 5 and maintains temperature between 130°F and 80°F.

D4.1 PREPARATION FOR CONTINUING UNIT COOLDOWN

INITIALS

D4.1.1 If required to cool down secondary systems and break condenser vacuum, then INITIATE Section E of this procedure.

CAUTION

To reduce thermal stratification in the Pressurizer Surge Line maintain the Delta-T between the RCS and the Pressurizer Steam Space as low as practical. The Delta-T of 320°F should not be exceeded.

D4.1.2 COMMENCE RCS/Pressurizer pressure and temperature trending at 30 minute intervals using Data Sheet 1 and ERF Computer. (Technical Specification 4.4.9.1, 4.4.9.2)

Plotting may be suspended during holds in the cooldown if the duration is expected to exceed one hour.

D4.1.3 ENSURE RHR letdown is in operation with flow rate greater than or equal to 75 gpm. _____

D4.1.4 If not previously performed, RAISE Pressurizer level to approximatley 65%. _____

UNIT NO. _____ INITIALS

D4.2 RCS COOLDOWN TO BETWEEN 130°F and 80°F

D4.2.1 COMMENCE the cooldown at a recommended rate of approximately 50°F per hour by performing the following:

a. Slowly ADJUST the RHR Outlet Valves HV-0606(0607) to reduce RCS temperature, _____

CAUTION

Ensure running RCP seal differential pressure is maintained greater than 200 psid.

b. MAINTAIN Pressurizer pressure at 250 psig, ±25 psig, by selective use of Pressurizer Backup Heaters. _____

D4.2.2 At 200°F, LOG time and date of entry into Mode 5 in the Unit Control Log Book. _____

_____
time/date

D4.2.3 RACK OUT and TAG the Containment Spray pump breakers on the applicable unit.

UNIT 1: CS PMP-A 1AA02-14 _____

CS PMP-B 1BA03-14 _____

UNIT 2: CS PMP-A 2AA02-14 _____

CS PMP-B 2BA03-14 _____

D4.2.4 As directed by the USS, PLACE the Containment Pre-access Purge System in operation per 13125, "Containment Purge System". _____*

D4.2.5 To facilitate personnel ingress and egress, during cold shutdown, NOTIFY Maintenance to bypass the Containment Personnel Lock Interlock System.

If desired the Containment Equipment Hatch Missile Shield may be moved at this time.

D4.2.6 NOTIFY Work Planning Group to schedule and initiate mode dependent Fire Protection Surveillances. _____

UNIT NO. _____ INITIALS

D4.2.7 If it is intended to drain the RCS to below 17% pressurizer level, then REQUEST Engineering to defeat the RHR Suction Valves Autoclosure Interlock per 54840, "Installation And Removal Instructions For The RCS Temporary Level Indication Tygon Tube And The Defeat Of The Residual Heat Removal Suction Valve Auto Closure Interlock". _____

D4.2.8 When the RCS temperature is between 120°F to 180°F and if it is intended to take the RCS solid and cooldown the Pressurizer, then PERFORM the following:

a. ENERGIZE all Pressurizer Heaters and maintain RCS pressure at 250 psig ±25 psig by use of Pressurizer Spray Valves, _____

b. ENSURE all CVCS Letdown Orifices are in operation, _____

CAUTION

Expect rapid Pressurizer pressure rise with charging flow greater than letdown flow at the point of going solid. Be prepared to reduce charging flow or raise letdown flow to prevent extreme pressure fluctuations.

NOTE

During the filling process, monitor Pressurizer liquid and steam space temperature. If liquid temperature lowers toward RCS temperature, then the Pressurizer fill rate should be reduced.

c. RAISE Pressurizer level by raising charging flow rate and/or lowering RHR letdown flow rate at a maximum filling rate of 30 gpm, _____

UNIT NO. _____ INITIALS

d. When the pressurizer is solid as indicated by rising RCS pressure or if PIC-131 is in AUTO rising letdown flow rate, then PERFORM the following:

(1) BALANCE charging and letdown flow rates using HV-0128 and/or PIC-131 to maintain RCS pressure at 250 psig ±25 psig, _____

NOTE

Charging flow may remain greater than letdown flow as a result of coolant contraction during the cooldown.

(2) Charging/RHR letdown flow rate should be adjusted so that RHR letdown purification flow is maintained greater than or equal to 75 gpm, _____

e. CONTINUE the Pressurizer cooldown by selectively de-energizing Pressurizer Heaters while maintaining Pressurizer spray. _____

D4.2.9 When the RCS temperature is less than 140°F, PERFORM the following:

a. If withdrawn, INSERT all Shutdown Banks to the fully inserted position, _____

b. OPEN the Reactor Trip Breakers, _____

c. STOP the CRDM Cooling Fans using the following handswitches:

CRDM UNIT - FAN 1 HS-12273A,
CRDM UNIT - FAN 2 HS-12274A,
CRDM UNIT - FAN 3 HS-12275A,
CRDM UNIT - FAN 4 HS-12276A. _____

d. If it is intended to remain in cold shutdown for greater than 4 days, then PLACE the SG's in wet layup as specified by Chemistry Department per 13001, "Steam Generator and Main Steam System Operation". _____

UNIT NO. _____ INITIALS

NOTE

The RCP(s) shall be run for one or more hours after reaching the desired RCS temperature plateau to enhance SG and RCS temperature equalization.

D4.2.10 When RCS temperature is less than 110°F, the remaining RCPs may be stopped per 13003, "Reactor Coolant Pump Operation".

D4.2.11 CONTINUE the Pressurizer cooldown by opening Pressurizer Auxiliary Spray Valve HV-8145.

a. INITIATE AUX SPRAY/PRZR DELTA-T surveillance per 14915, "Special Conditions Surveillance Logs", (Technical Specification 4.4.9.2), *

b. If pressurizer auxiliary spray water delta-T exceeds 320°F, then LOG the spray valve operation in the Unit Control Log and NOTIFY Technical Support to log the cycle per 83101-C, "Component Cyclic or Transient Limits", *

c. CLOSE the open Charging Isolation Valve HV-8146 or HV-8147,

d. Continue CHARGING through the Pressurizer auxiliary spray line until pressurizer steam space temperature is less than 190°F.

D4.2.12 MAINTAIN RCS temperature between 130°F and 80°F using RHR HX Outlet Valves HV-0606(0607).

NOTIFY Technical Support to log the unit cooldown per 83101-C, "Component Cyclic or Transient Limits". *

UNIT NO. _____ INITIALS

CAUTION

Ensure all RCP's are shutdown.

D4.2.13 If it is desired to depressurize the RCS, then PERFORM the following:

a. INITIATE Lowering RCS pressure to atmospheric (50 psig as indicated on PI-408, 418, 428 or 438) using letdown pressure control PIC-131, _____

b. When RCS pressure reaches 100 psig (150 psig as indicated on PI-408, 418, 428, 438), CLOSE all RCP Seal Leakoff Isolation valves HV-8141A, B, C, D, _____

c. ENSURE PRT nitrogen pressure is maintained greater than 0.5 psig. _____

NOTE

SI Pmp Cold Leg Isolation Valves are closed to preclude inadvertent draining of RWST to the RCS while the RCS is depressurized and partially drained.

D4.2.14 ISOLATE the Safety Injection Cold legs by performing the following:

a. CLOSE SI PMP-A TO COLD LEG ISO VLV HV-8821A, _____

b. CLOSE SI PMP-B TO COLD LEG ISO VLV HV-8821B, _____

c. OPEN and TAG the following SI Cold Leg Isolation Valves MCC breakers on the applicable unit:

UNIT 1:	1-HV-8821A	1ABD-15	_____
	1-HV-8821B	1BBD-15	_____
UNIT 2:	2-HV-8821A	2ABD-15	_____
	2-HV-8821B	2BBD-15	_____

d. OPEN and TAG MCC Relay K2 Links for the above MCC breakers. _____

UNIT NO. _____ INITIALS

CAUTION

Prior to opening any portion of the RCS to the atmosphere, the hydrogen concentration in the affected portion must be reduced to less than 5cc/kg.

D4.2.15 When required, INITIATE RCS draining by performing the following:

a. If it is intended to drain down to perform maintenance on Reactor Head, SG's or RCP seals, then the following RCS level controls shall be placed into effect:

(1) DETERMINE closure status of Containment Equipment Hatch and ENSURE hatch is capable of being closed within 57 minutes or ENSURE hatch is closed prior to reducing RCS level below three feet below the Reactor Vessel Flange (191 ft. el.). _____

(2) A review of all Containment penetrations addressed in 14210, "Containment Building Penetrations - Refueling" should be accomplished to determine those which have been opened by manual means and an info LCO generated for those identified. _____

(3) If SG Nozzle Dams are to be installed and no cold leg opening is to be established, a vent path is required from the Reactor Vessel upper plenum.

This vent path can be satisfied by:

(a) Removing a pressurizer manway, or

(b) Removing a Steam Generator manway on a hot leg that will not be dammed, or

(c) Removing three pressurizer code safeties. _____

UNIT NO. _____ INITIALS

(4) If SG Nozzle Dams are to be installed and a cold leg opening is to be established, a vent path is required from the Reactor Vessel Upper Plenum by removing an SG manway on an HL that will not be dammed.

(5) If it is intended to operate at one foot above mid-nozzle level, the preferred RHR configuration is one train operating with a flow of 3000 gpm, _____

(6) If it is intended to operate below 191 ft. el., then:

(a) A minimum of two incore thermocouples shall be available during periods where the Reactor Head is installed, _____

(b) REQUEST I&C reset the designated ERF incore thermocouples alarm setpoint to alarm at 10°F above desired temperature per 00410-C, "Computer Software Control". _____

(7) I&C should be notified to install temporary remote RCS level monitoring in the Control Room, _____

(8) Tygon tube watch is required any time the RCS level is being changed while the RCS level is below 17% (approximately 207 feet elevation) pressurizer level, _____

(9) Periodic comparison checks should be made every 4 hours between the Control Room Temporary RCS Level Monitors and the Tygon tube, _____

(10) The Control Room Monitors should agree within 7 percent of scale with the Tygon tube,

UNIT NO. _____ INITIALS

(11) Two out of three Level Monitors must agree before draining RCS below the top of the hot leg (188 feet 3 inches),

(12) If neither Control Room RCS Level Monitor is available, then a continuous Tygon tube watch should be established while RCS level is below 17% pressurizer level, _____

(13) While operating with SG Nozzle Dams installed, ENSURE one Safety Injection Pump is capable of being racked in and operated in the hot leg injection mode if needed,

(14) While level is in the region of the hot legs, TREND RHR Pump parameters on ERF for early detection of possible RHR Pump degradation due to vortexing,

(15) Minimum RCS level is one foot above mid-nozzle (188 feet 0 inches elevation) except for Steam Generator burping during initial drain down. For effective SG tube draining, RCS level should be lowered to 187 feet 6 inches. Upon completion of SG burping, RAISE RCS level to 188 feet - 0 inches and MAINTAIN at this level thereafter, _____

(16) A minimum of 4 Containment Cooling Units will be operable and capable of being started if required while RCS level is below 191 feet elevation.

UNIT NO. _____ INITIALS

NOTE

Dose Equivalent Iodine should be below 0.1 uCi/gm, Xe-133 and Co-58 below 0.05 uCi/gm prior to opening the RCS to the containment atmosphere.

b. OBTAIN Chemistry concurrence that RCS chemistry is appropriate for draining the RCS. _____

c. INITIATE draining the RCS per 13005, "Reactor Coolant System Draining".

D4.2.16 If it is intended to drain the RCS to less than 25% cold calibrate pressurizer level, then prior to reaching 25% ISOLATE potential dilution flow paths by performing the following:

a. CLOSE, LOCK and TAG the following valves on the applicable unit:

(1) UNIT 1:

CVCS ISOLATION RMW TO BA BLEND, 1-1208-U4-175 _____

CVCS ISOLATION RMW TO CVCS, 1-1208-U4-177 _____

(2) UNIT 2:

CVCS ISOLATION RMW TO CVCS, 2-1208-U4-177 _____

CVCS ISOLATION RMW TO BA BLEND, 2-1208-U4-175 _____

b. ENSURE CLOSED, LOCKED and TAGGED the following valves on the applicable unit:

(1) UNIT 1:

CVCS OUTLET CHEM MIXING TK, 1-1208-U4-181 _____

CVCS SUPPLY RMW TO CHEM MIXING TK, 1-1208-U4-176 _____

CVCS FLUSH RMW TO TRN A EMERG BORATION, 1-1208-U4-183 _____

RMWST TO BTRS ISO, 1-1208-U6-226 _____

UNIT NO. _____ INITIALS

(2) UNIT 2: CVCS SUPPLY RMW TO CHEM MIXING TK, 2-1208-U4-176 _____

CVCS OUTLET CHEM MIXING TK, 2-1208-U4-181 _____

CVCS FLUSH RMW TO TRN A EMERG BORATION, 2-1208-U4-183 _____

RMWST TO BTRS ISO, 2-1208-U6-226 _____

c. When necessary, makeup to the VCT by performing the following:

(1) OPEN RWST TO CCP A & B SUCTION Valves LV-0112D and LV-0112E,

(2) CLOSE VCT OUTLET ISOLATIONS, LV-0112B and LV-0112C,

(3) ENSURE Letdown to VCT or Hold-up Tank Valve LV-0112A is in the VCT position,

(4) When VCT level has been returned to normal, OPEN LV-0112B and LV-0112C then CLOSE LV-0112D and LV-0112E.

D4.2.17 OPERATE unit systems as necessary to maintain the above conditions.

a. If required to break condenser vacuum, then PROCEED to Section E,

b. If it is intended to proceed to Mode 6, then GO to 12007-C, "Refueling Entry",

c. If it is intended to commence unit heat up, then GO to 12001-C, "Unit Heatup to Hot Shutdown".

END OF SECTION D

UNIT NO. _____

SECTION E. Secondary Plant Shutdown

NOTE

This section directs secondary plant activities during unit shutdown and can be used in conjunction with primary system cooldown operations.

The subsections of this section are:

E4.1 Transfer From Steam Dumps to Atmospheric Relief valves.

E4.2 Feeding Steam Generators With Condensate Pump.

E4.3 Breaking Condenser Vacuum.

E4.4 Secondary Systems activities.

E4.1 TRANSFER FROM STEAM DUMPS TO ATMOSPHERIC RELIEF VALVES

INITIALS

E4.1.1 TRANSFER to the SG Atmospheric Relief Valves by performing the following:

a. Slowly OPEN each atmospheric relief while verifying a reduced steam dump demand signal on UI-507, _____

b. VERIFY that the Steam Dump Control Valves close if PIC-507 is in AUTO or if operating in MANUAL, slowly CLOSE the Steam Dump Control Valves while opening each atmospheric relief, _____

c. When all Steam Dump Control Valves are closed, ENSURE PIC-507 is in MANUAL, _____

d. BALANCE the positions of each atmospheric relief while maintaining Tavg as desired. _____

UNIT NO. _____ INITIALS

E4.2 FEEDING STEAM GENERATORS WITH CONDENSATE PUMP

E4.2.1 At the USS's discretion, INITIATE feeding Steam Generators with the running Condensate Pump by performing the following:

a. VERIFY SG pressure is less than 550 psig, _____

b VERIFY that lube oil pressure to the reset MFP and MFP Turbine Bearings is 10 to 12 psig by local indications, _____

c. OPEN the reset MFP Discharge Valve by placing the Control Switch in OPEN-PULL-TO-LOCK at the Main Control Panel QMCB: _____

SGFP A HS-5208,

SGFP B HS-5209.

d. If not previously performed, RESET both trains of Feedwater Isolation:

(1) HS-40049 for Train A, _____

(2) HS-40050 for Train B. _____

e. OPEN all BFIV's, _____

f. CONTINUE maintaining desired SG level utilizing the BFRV's. _____

UNIT NO. _____ INITIALS

E4.3 BREAKING CONDENSER VACUUM

E4.3.1 If necessary, TRANSFER the Auxiliary Steam System steam supply to the alternate unit or Auxiliary Boiler per 13761, "Auxiliary Steam System". _____

E4.3.2 TRANSFER the Turbine Steam Seal supply to the Auxiliary Steam Supply per 13825, "Turbine Steam Seal System". _____

E4.3.3 TRANSFER the SJAE steam supply to the Auxiliary Steam Supply per 13620, "Condenser Air Ejection System". _____

E4.3.4 CLOSE the MSIVs and Bypasses. _____

CAUTION

Breaking condenser vacuum will result in a MFPT Low Vac Trip. If AFWAS has not been defeated, then both MFPs tripped will result in a AFWAS initiation.

E4.3.5 PLACE the standby MDAFW Pump(s) Handswitches in PULL-TO-LOCK. _____

E4.3.6 BREAK condenser vacuum and SHUT DOWN the Steam Jet Air Ejectors and the Condenser Vacuum Pumps per 13620, "Condenser Air Ejection System".

E4.3.7 PERFORM the following to reset the AFWAS signal:

a. RESET the AFWAS by resetting one MFPT Low Vacuum Trip by momentarily placing the MFPT-A(B) VAC TRIP BYPASS Handswitch to RESET position and MFPT A(B) TRIP RESET HS-3169 (3170) to the RESET position, _____

b. If running a MDAFW Pump, then THROTTLE the AFW Flow Control Valves to the pre-initiation flow rate, _____

UNIT NO. _____ INITIALS

c. If applicable, ENSURE the SG Blowdown Isolation Valves HV-7603A(B,C,D) open. _____

E4.3.8 After the condenser pressure reaches atmospheric, SHUT DOWN the Turbine Steam Seal System per 13825, "Turbine Steam Seal System". _____

E4.3.9 MAINTAIN the main Turbine and MFPTs on Turning Gear per 13800, "Main Turbine Operation" and 13615, "Condensate and Feedwater Systems".

E4.4 SECONDARY SYSTEM ACTIVITIES

E4.4.1 If condensate and feedwater cleanup is not anticipated, then when condensate and feedwater metal temperatures are less than 200°F, SHUT DOWN the Condensate and Feedwater System per 13615, Condensate And Feedwater Systems". _____

E4.4.2 NOTIFY Chemistry and SHUT DOWN the Condensate Filter Demineralizer System per 13616, "Condensate Filter Demineralizer System". _____

E4.4.3 If the secondary outage is planned to exceed 10 days, then PERFORM the following:

a. When condensate and feedwater metal temperature is between 90°F and 200°F, COORDINATE with Chemistry and PLACE the Feedwater Heaters in wet layup, _____

b. When Turbine metal temperatures reach ambient, REMOVE Turbine from Turning Gear per 13800, "Main Turbine Operation", _____

c. During the unit outage, once a week, PLACE the Turbine on Turning Gear for 4 to 6 hours.

UNIT NO. _____ INITIALS

E4.4.4 If required, PLACE a steam blanket on the MSRs per 13800, "Main Turbine Operation". _____

E4.4.5 If required, for Condenser Waterbox or Circulating Water System maintenance, SHUT DOWN the Circulating Water System per 13724, "Circulating Water System". _____

If required for maintenance or inspection, then INITIATE draining of the Condenser Waterboxes per 13724, "Circulating Water System". _____

E4.4.6 If main generator maintenance or inspection is planned, then INITIATE purging the main generator per 13810, "Generator Gas System". _____

If hydrogen atmosphere is to be maintained, then MINIMIZE usage during the outage by reducing hydrogen pressure to not less than 5 psig.

E4.4.7 SHUT DOWN the Isophase Bus Duct Cooling System by performing the following:

a. At 480V AC SWGR NB03, OPEN Isophase Bus Duct Heater Breaker on the applicable unit:

UNIT 1: 1NB03-16, _____

UNIT 2: 2NB03-16. _____

b. At local Panel PLCB, STOP the running fan using HS-16550 for Fan No. 1 and/or HS-16551 for Fan No. 2.

Completed _____
Signature Date/Time

Reviewed _____
Signature Date/Time

Comments _____

_____

_____

5.0 REFERENCES

5.1 PROCEDURES

5.1.1	00410-C,	"Computer Software Control"
5.1.2	10006-C,	"Reactor Trip Review"
5.1.3	12001-C,	"Unit Heatup To Hot Shutdown"
5.1.4	12002-C,	"Unit Heatup To Normal Operating Temperature And Pressure"
5.1.5	12003-C,	"Reactor Startup"
5.1.6	13003,	"Reactor Coolant Pump Operation"
5.1.7	13005,	"Reactor Coolant System Draining"
5.1.8	13006,	"Chemical And Volume Control System Startup And Normal Operation"
5.1.9	13007,	"VCT Gas Control And RCS Chemical Addition"
5.1.10	13009,	"CVCS Reactor Makeup Control System"
5.1.11	13010,	"Boron Thermal Regeneration System"
5.1.12	13011,	"Residual Heat Removal System"
5.1.13	13120,	"Containment Building Cooling Systems"
5.1.14	13125,	"Containment Purge System"
5.1.15	13601,	"Steam Generator And Main Steam System Operation"
5.1.16	13605,	"Steam Generator Blowdown Processing System"
5.1.17	13610,	"Auxiliary Feedwater System"
5.1.18	13615,	"Condensate And Feedwater Systems"
5.1.19	13616,	"Condensate Filter Demineralizer System"
5.1.20	13617,	"Feedwater Heater Extraction, Vent And Drain System"
5.1.21	13620,	"Condenser Air Ejection System"
5.1.22	13724,	"Circulating Water System"

5.1.23	13760,	"Auxiliary Steam Boiler System"
5.1.24	13761,	"Auxiliary Steam System"
5.1.25	13800,	"Main Turbine Operation"
5.1.26	13810,	"Generator Gas System"
5.1.27	13825,	"Turbine Steam Seal System"
5.1.28	14000,	"Operations Shift and Daily Surveillance Logs"
5.1.29	14005,	"Shutdown Margin Calculations"
5.1.30	14210,	"Containment Building Penetrations - Refueling"
5.1.31	14748,	"AFW Check Valve Cold Shutdown Inservice Test"
5.1.32	14915,	"Special Conditions Surveillance Logs"
5.1.33	24695,	"N.I. System Source Range Channel Calibration"
5.1.34	24696,	"N.I. System Source Range Channel Calibration"

END OF PROCEDURE TEXT

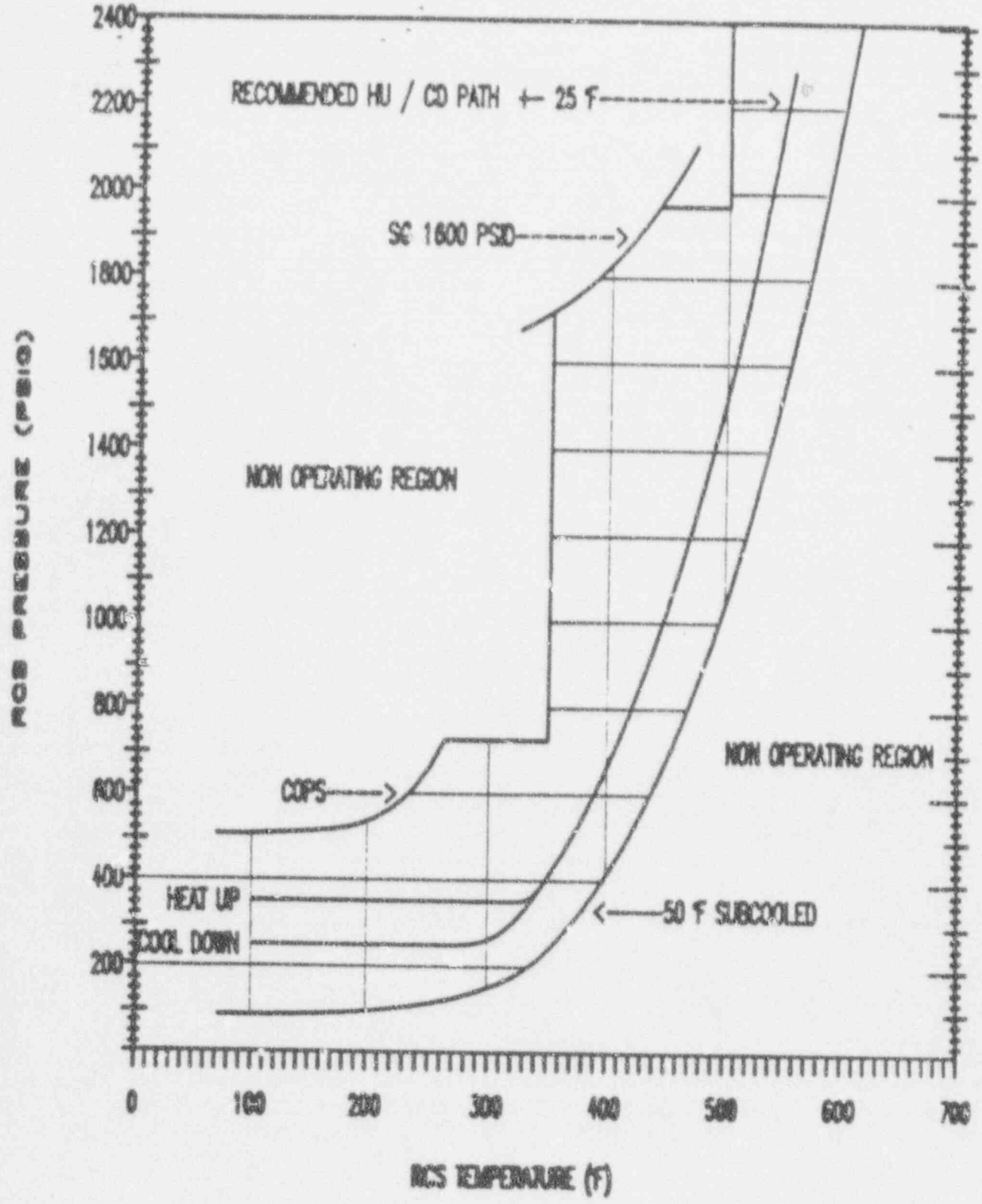


FIGURE 1 - RCS PRESSURE TEMPERATURE LIMITS

Sheet 1 of 1

UNIT NO. _____ DATE ___/___/___

RCS/PRZR TEMPERATURE AND PRESSURE

DATA SHEET 1

TIME	Lowest Channel of TI-0413B TI-0423B TI-0433B TI-0443B RCS TEMP	PRZR TEMP TI-0454	PRZR TEMP TI-0453	PI-438LR or PI-405WR PRZR PRESS	PRZR/RCS DELTA T

Completed _____
Signature Date/Time

Reviewed _____
Signature Date/Time

Comments _____

Approval	Vogtle Electric Generating Plant	Procedure No.
J Bockhold	NUCLEAR OPERATIONS	12007-C
Date		Revision No.
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UNIT NO. MID LOOP STEPS AND PAGES

DATE 1 1

REFUELING ENTRY

05-29-90

2.1.4, 2.2.4, 2.2.15
4.1.1, 4.1.3

(MODE 5 TO MODE 6)

1

1.0 PURPOSE

This procedure provides instructions for taking the unit from a cold shutdown (Mode 5) with Reactor Coolant temperature between 80 and 130 degrees, to refueling condition (Mode 6), and initiating core alterations.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

2.1.1 If this procedure is terminated prior to completion, the Unit Shift Supervisor (USS) should note the reason for the termination in the comments section.

2.1.2 Notify Health Physics prior to performing operations evolutions which may significantly alter radiation levels.

2.1.3 Notify Chemistry prior to installing or removing the Containment Equipment Hatch that containment ventilation flow will be changed during this evolution.

2.1.4 During periods of operation with the Reactor Coolant System (RCS) level below the Reactor Vessel Flange elevation (194 feet elevation), ongoing work activities should be closely scrutinized and any work activity limited that has the potential for reducing RHRS capability.

2.1.5 Inadvertent Containment Ventilation Isolation (CVI) may occur during the movement of the Reactor Vessel Head from the cavity to the head stand. Ensure Health Physics initiates compensatory actions to prevent inadvertent actuations.

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2.2 LIMITATIONS

2.2.1 The RCS pressure and temperature shall not exceed 425 psig and 350 degrees when open to the Residual Heat Removal (RHR) System.

2.2.2 In Mode 5, shutdown margin shall be greater than or equal to the limit specified in Technical Specification 3.1.1.2, Figure 3.1-2.

2.2.3 While in Mode 6 (whenever fuel is in the Reactor Vessel with the Reactor Vessel Head Closure Bolts less than fully tensioned or with the head removed) Keff shall be maintained at 0.95 or less, or the boron concentration shall be maintained greater than or equal to 2000 ppm, whichever is more restrictive. Additionally, valves 1208-U4-175, 1208-U4-177, 1208-U4-183 and 1208-U4-176 shall be closed and secured in position (by mechanical stops), except 1208-U4-176 and 1208-U4-177 may be opened for short periods of time for chemistry control provided the Hi Flux at Shutdown Alarm is operable with a setpoint of less than or equal to 2.30 times background. (Technical Specification 3.9.1)

2.2.4 When in Mode 5, with loops filled, at least one RHR Train shall be operable and in operation, and either:

REINFORCES MIDLOOP ACTIVITIES

a. One additional RHR train shall be operable, or

b. The secondary side water level of at least two Steam Generators shall be greater than 17% of wide range level. (Technical Specification 3.4.1.4.1)

2.2.5 While in Mode 5 with the RCS loops not filled, two RHR trains shall be operable and at least one RHR train shall be in operation. Reactor Makeup Water Valves 1208-U4-175, 1208-U4-176, 1208-U4-177, and 1208-U4-183 shall be closed and secured in position (by mechanical stops), except 1208-U4-176 and 1208-U4-177 may be opened for short periods of time for chemistry control provided the Hi Flux at Shutdown Alarm is operable with a setpoint of less than or equal to 2.30 times background. (Technical Specification 3.4.1.4.2)

2.2.6 When in Mode 6, with the water level greater than or equal to 23 feet above the Reactor Vessel Flange, at least one RHR train shall be operable and in operation. (Technical Specification 3.9.8.1)

2.2.7 When in Mode 6, with the water level less than 23 feet above the Reactor Vessel Flange, two RHR trains shall be operable and at least one RHR train in operation. (Technical Specification 3.9.8.2)

2.2.8 While in Modes 4, 5, and 6 with the Reactor Vessel Head on, at least one of the following Cold Overpressure Protection Systems (COPS) shall be operable:

a. Two Power Operated Relief Valves (PORV) with lift settings which do not exceed the limits established in Technical Specification Figure 3.4-4, or

b. Two RHR Suction Relief Valves each with a setpoint of 450 psig ±3%, or

c. The RCS depressurized with an RCS vent capable of relieving at least 670 gpm water flow at 470 psig. (Technical Specification 3.4.9.3)

2.2.9 While in Modes 5 and 6, at least one of the following Boron Injection Flow Paths shall be operable.

a. A flow path from the Boric Acid Storage Tank via a Boric Acid Transfer Pump and a Charging Pump to the Reactor Coolant System if the Boric Acid Storage Tank is operable, or

b. The flow path from the Refueling Water Storage Tank (RWST) via a Charging Pump to the Reactor Coolant System if the Refueling Water Storage Tank is operable. (Technical Specification 3.1.2.1)

2.2.10 The temperature of both the primary and secondary coolant in the Steam Generators shall be greater than 70 degrees when the pressure of either coolant in the Steam Generator is greater than 200 psig. (Technical Specification 3.7.2)

2.2.11 While in Mode 5 at least one channel of Source Range Nuclear Instrumentation should be selected to Recorder NR-45 and the CONTROL ROOM HI FLUX LEVEL AT SHUTDOWN alarm operable.

2.2.12 While in Mode 6 both Source Range Neutron Flux Monitors shall be operable with continuous visual indication in the Control Room and one with audible indication in the Containment and Control Room. (Technical Specification 3.9.2)

2.2.13 The reactor shall have been subcritical for at least 100 hours prior to moving irradiated fuel in the Reactor Pressure Vessel. (Technical Specification 3.9.3)

2.2.14 During Core Alterations, direct communications shall be maintained between the Control Room and personnel at the Refueling Station. (Technical Specification 3.9.5)

2.2.15 While in Modes 5 and 6, with the RCS level below Reactor Vessel Flange elevation (194 feet elevation), the RWST will be operable with a minimum volume of 99,404 gallons (9% of instrument span) of water at a boron concentration between 2400 and 2600 ppm.

3.0 INITIAL CONDITIONS

3.1 The RHR System is in operation at a minimum flow of 3000 gpm and RHR letdown is in service.

3.2 Sufficient Carbon Dioxide and Nitrogen is on hand or ordered to support plant operations.

3.3 If required, there is sufficient volume available in the RWST at a minimum boron concentration of 2400 ppm to support refueling operations.

UNIT NO. _____ INITIALS

4.0 INSTRUCTIONS

4.1 MODE 5 AND 6 OPERATIONS

NOTE

Asterisk (*) steps beside INITIALS spaces indicates steps that generate additional documents.

4.1.1 While operating with the RCS level below 17% pressurizer level (approximately 207 feet elevation) the following controls should be in effect:

a. Tygon tube watch is required any time the RCS level is being changed while the RCS level is below 17% (approximately 207 feet elevation) pressurizer level, _____

(1) Periodic comparison checks should be made every 4 hours between the Control Room Temporary RCS Level Monitors and the Tygon tube, _____

(2) The Control Room Monitors should agree within 7 percent of scale with the Tygon tube,

(3) Two out of three Level Monitors must agree before draining RCS below the top of the hot leg (188 feet 3 inches),

(4) If neither Control Room RCS Level Monitor is available, then a continuous Tygon tube watch should be established while RCS level is below 17% pressurizer level. _____

UNIT NO. _____ INITIALS

b. If it is intended to drain down to less than 3 feet below the Reactor Vessel Flange (191 ft. el.) then the following additional controls shall be placed in effect:

(1) DETERMINE closure status of Containment Equipment Hatch and ENSURE hatch is capable of being closed within 57 minutes or ENSURE hatch is closed prior to reducing RCS level below three feet below the Reactor Vessel Flange (191 ft. el.), _____

(2) A review of all Containment penetrations addressed in 14210, "Containment Building Penetrations - Refueling" should be accomplished to determine those which have been opened by manual means and an info LCO generated for those identified, _____

(3) A minimum of two incore thermocouples shall be available during periods where the Reactor Head is installed, _____

(4) REQUEST I&C reset the designated ERF incore thermocouples alarm setpoint to alarm at 10°F above desired temperature per 00410-C, "Computer Software Control", _____

(5) If SG Nozzle Dams are to be installed and no cold leg opening is to be established, a vent path is required from the Reactor Vessel upper plenum.

This vent path can be satisfied by:

(a) Removing a pressurizer manway, or

(b) Removing a Steam Generator manway on a hot leg that will not be dammed, or

(c) Removing three pressurizer code safeties. _____

UNIT NO. _____ INITIALS

(6) If SG Nozzle Dams are to be installed and a cold leg opening is to be established, a vent path is required from the Reactor Vessel Upper Plenum by removing an SG manway on an HL that will not be dammed.

(7) If it is intended to operate at one foot above mid-nozzle level, the preferred RHR configuration is one train operating with a flow of 3000 gpm, _____

(8) While operating with SG Nozzle Dams installed, ENSURE one Safety Injection Pump is capable of being racked in and operated in the hot leg injection mode if needed, _____

(9) While level is in the region of the hot legs, TREND RHR Pump parameters on ERF for early detection of possible RHR Pump degradation due to vortexing, _____

(10) Minimum RCS level is one foot above mid-nozzle (188 feet 0 inches elevation) except for Steam Generator burping during initial drain down. For effective SG tube draining, RCS level should be lowered to 187 feet 6 inches. Upon completion of SG burping, RAISE RCS level to 188 feet - 0 inches and MAINTAIN at this level thereafter. _____

(11) A minimum of 4 Containment Cooling Units will be operable and capable of being started if required while RCS level is below 191 feet elevation.

UNIT NO. _____ INITIALS

4.1.2 MAINTAIN RCS temperature in range of 80 to 130 degrees and a total flow of 3000 gpm by adjusting the RHR System as necessary per 13011, "Residual Heat Removal System". _____

4.1.3 During RCP seal package maintenance or SG primary side inspections, MAINTAIN RCS level at 188 feet - 0 inches (one foot above mid-nozzle elevation). _____

NOTE

Maintain RCP seal injection in operation while RCS level is greater than 190 feet - 0 inches elevation.

4.1.4 During preparation for Reactor Vessel head removal, MAINTAIN RCS level less than or equal to 192 feet (two feet below Vessel Flange elevation). _____

4.1.5 If the outage is for refueling, then ENSURE that the RCS has been borated to refueling concentration per 13009, "CVCS Reactor Makeup Control System". _____

UNIT NO. _____ INITIALS

4.2 PREPARATIONS FOR REFUELING

4.2.1 Twelve hours prior to transferring water from the RWST to the Reactor Cavity or the Reactor Vessel, INITIATE RWST recirculation in preparation for RWST chemistry sample. _____

4.2.2 VERIFY that the Fuel Pool To Transfer Canal Gate is closed. _____

4.2.3 PREPARE the Refueling Cavity lower level for refueling operations and Fuel Transfer System checkouts by performing the following:

NOTE

This step may be deferred to just prior to head lift. Intent is to provide early lead time to fill the transfer tube to establish a containment penetration water seal in preparation for head lift and provide water lubrication for Fuel Transfer System checkouts.

a. PERFORM the following prefill alignment:

(1) CLOSE and TAG Cavity Drain Isolation on the applicable unit:

UNIT 1: 1-1901-U6-260, _____

_____ IV

UNIT 2: 2-1901-U6-260, _____

_____ IV

(2) ENSURE Maintenance has installed the 2 Blind Flanges on the 12 inch drain lines in the Refueling Cavity, _____

UNIT NO. _____ INITIALS

(3) ENSURE Maintenance has completed Reactor Cavity Sealing per 93240-C, "Reactor Vessel Assembly/Disassembly Instructions", _____

(4) ENSURE Maintenance has removed the Transfer Tube Blind Flange per 93240-C, "Reactor Vessel Assembly/Disassembly Instructions", _____

(5) If the Transfer Canal level has been lowered to below the Transfer Tube elevation, then UNLOCK and OPEN the Transfer Tube Gate Valve, _____

(6) After the RWST has recirculated for a minimum of 6 hours, CONTACT Chemistry to take a sample from the RWST to verify total suspended solids concentration is within specifications. _____

If total suspended solids concentration is out of specifications, INITIATE RWST Cleanup per 13719, "Spent Fuel Pool Cooling And Purification System". _____

NOTE

If the Transfer Canal is flooded above the Transfer Tube elevation with the Transfer Tube Gate Valve closed, then Step 4.2.3b may be N/A'd.

b. FILL the lower Reactor Cavity from the RWST via the SFP Cooling System to an elevation of at least 188 feet - 0 inches (approximately 2 feet above the Fuel Transfer Tube centerline) per 13719, "Spent Fuel Pool Cooling And Purification System". _____

UNIT NO. _____ INITIALS

c. If the lower reactor cavity was filled, then NOTIFY Chemistry to initiate daily plant vent Tritium grab samples (Technical Specifications Table 4.11-2 Note 4). _____

Person Contacted _____ Date _____ Time _____

4.2.4 PERFORM the following refueling preparation valve alignment on the applicable unit:

a. ENSURE CLOSED RCS RV SEAL LKOFF INNER GASKET ISO. (OSS EL - 172 feet)

UNIT 1: 1-1201-U4-087 _____

_____ IV

UNIT 2: 2-1201-U4-087 _____

_____ IV

b. CLOSE RCS RV SEAL LKOFF OUTER GASKET ISO. (OSS EL - 172 feet)

UNIT 1: 1-1201-U4-088 _____

_____ IV

UNIT 2: 2-1201-U4-088 _____

_____ IV

c. CLOSE RV LEAKOFF ISO HV-8032, _____

_____ IV

d. ENSURE CLOSED REACTOR CAVITY SEAL SUPPORT DRAIN

UNIT 1: 1-1213-U4-088 _____

_____ IV

UNIT 2: 2-1213-U4-088 _____

_____ IV

UNIT NO. _____ INITIALS

4.2.5 If desired, reset the FHB HVAC pre-heating Coil Thermostat from 70°F to 80°F by placing local handswitches HS-12470 and HS-12471 to the ON position. _____

4.2.6 NOTIFY Health Physics to establish a locked or posted access on the concrete plugs for the Fuel Transfer Tube Bellows in the Fuel Handling Building and Containment Building. _____

4.3 MODE 6 ENTRY

4.3.1 Prior to Maintenance Department detensioning the first Reactor Head Bolt (Mode 6 entry), PERFORM the following:

NOTE

If the target time for entry into Mode 6 has slipped due to delays or holds, then review the Pre-refueling Checklist and reperform those applicable surveillances required to be performed within the specified time frames prior to entry into Mode 6.

a. INITIATE Mode 6 Entry Checklist 1, completing those applicable steps within the specified time frames prior to entry into Mode 6, _____

b. OBTAIN from the Control Room Mode Change Binder or OBTAIN from the Surveillance Tracking Coordinator all deferred (not performed) surveillance tests required for Mode 6 entry. _____

SCHEDULE and COMPLETE those applicable test procedures prior to Mode 6 entry.

UNIT NO. _____ INITIALS

c. REVIEW the following for impact on entering Mode 6.

(1) Jumper and Lifted Wire Log, _____

(2) Temporary Modification Log, _____

(3) Equipment Clearance Log, _____

(4) LCO Book, _____

(5) Outstanding Work Orders. _____

NOTE

Two RCS Core Exit Thermocouples shall be maintained when RCS level is less than 191 ft. el.

d. COORDINATE with the Outage Area Supervisor to ensure that the following Reactor Vessel Head disassembly activities have been completed per 93240-C, "Reactor Vessel Assembly/Disassembly Instructions".

(1) Seismic Tie Rods moved, _____

(2) Cables disconnected, _____

(3) Head Insulation removal, _____

(4) Head Vent piping disconnect, _____

(5) RVLIS Head connection disconnected, _____

(6) Instrument port Conoseal disassembly complete. _____

4.3.2 OBTAIN On-Shift Operations Supervisor's approval to change status from Mode 5 to Mode 6.

_____ / / _____

OSOS Signature Date Time

4.3.3 When notified by Maintenance Department that the Reactor Vessel Head detensioning has commenced, LOG Mode 6 entry into the Unit Control Logbook and INITIATE Mode 6 Log Sheet readings. _____

UNIT NO. _____ INITIALS

4.4 MODE 6 OPERATIONS

4.4.1 In addition to the scheduled Mode 6 surveillances, NOTIFY Chemistry Department to initiate Boron analysis of the RCS and, if applicable, the Refueling Cavity at least once per 72 hours. (Technical Specification 4.9.1.1) _____

Person Contacted _____ Date _____ Time _____

4.4.2 COMPLETE the following to prepare for Reactor Vessel Head lift:

NOTE

As a precaution, Containment Building Penetrations Technical Specification 3.9.4 will be established during periods of Reactor Vessel Head movement.

a. NOTIFY Chemistry that closure of the Containment Equipment Hatch will change containment ventilation flow. _____

b. NOTIFY Maintenance to reset the Containment Personnel Lock Interlock System, _____

c. PERFORM 14210, "Containment Building Penetrations Verification - Refueling", _____ *

d. ENSURE one train of RHR is aligned for Refueling Cavity fill per 13011, "Residual Heat Removal System", _____

UNIT NO. _____ INITIALS

CAUTION

Inadvertent Containment Ventilation Isolation (CVI) may occur during the movement of the Reactor Vessel Head from the cavity to the head stand. Ensure Health Physics initiates compensatory actions to prevent inadvertent actuations.

e. COORDINATE with the Outage Area Supervisor to ensure that the following activities have been completed per 93240-C, "Reactor Vessel Assembly/Disassembly Instructions".

(1) Power and Signal Cables removed, _____

(2) Flux Thimbles withdrawn, _____

(3) Tools removed from refueling cavity. _____

4.4.3 After the head lift, COORDINATE with Outage Area Supervisor and INITIATE filling the Refueling Cavity to 218 feet - 6 inches (2 feet below operating deck) per 13011, "Residual Heat Removal System". _____

During the process of filling the Refueling Cavity, PERFORM 14895, "ECCS Check Valve Refueling Inservice Test". _____ *

4.4.4 If the Lower Reactor Cavity was not previously filled, then NOTIFY Chemistry to initiate daily plant vent Tritium grab samples. (Technical Specification Table 4.11-2 Note 4) _____

Person Contacted _____ Date _____ Time _____

4.4.5 During the remainder of refueling preparations and core alterations, MAINTAIN Refueling Cavity level at 218 feet - 6 inches plus 0 inches minus 3 inches. _____

UNIT NO. _____ INITIALS

4.4.6 PLACE the Refueling Cavity Filtration System in service per 13719, "Spent Fuel Pool Cooling And Purification System". _____

NOTE

Removal of the Upper Internals Assembly and withdrawal of any RCCA assembly in excess of three feet from its fully inserted position within the Reactor Vessel should be considered as Core Alterations.

4.4.7 Prior to moving the Upper Internals Assembly, COMPLETE the applicable steps of Core Alterations Checklist 2. _____

4.4.8 After the Upper Internal Assembly has been set in the storage location and the Refueling Cavity level has been stable at 218 feet - 6 inches, VERIFY that the fuel pool level is approximately equal to the transfer pool level. _____

a. If the Transfer Gate Valve was not opened per Step 4.2.3a(5), then UNLOCK and OPEN the Transfer Tube Gate Valve, _____

b. OPEN the Fuel Pool To Transfer Canal Gate. _____

4.4.9 NOTIFY Chemistry to reset PERMS Containment Low Range Area Monitors RE-0002 and 0003 to the low setpoint. _____

UNIT NO. _____ INITIALS

4.4.10 Prior to transporting fuel or other loads within or over the Spent Fuel Pool with spent fuel in the pool and the Normal FHB HVAC in service, UNBLOCK the Low Negative Differential Pressure FHBI actuation channels at the BOP Actuation Cabinet QESF by performing the following:

a. VERIFY the FHB negative pressure is above the actuation setpoint by observing white lights A-ZI-12567 and A-ZI-12568 at handswitch A-HS-2533C OUT. _____

b. PLACE handswitch A-HS-2533C to the OFF position. _____

IV

4.4.11 Prior to commencing fuel shuffle COMPLETE Core Alterations Checklist 2. _____

LOG the date and time that Core Alterations are started in the Unit Control Logbook. _____

4.4.12 During Core Alterations, if Core Alterations cease for greater than 1 hour, then prior to commencing core alterations, REFER to Checklist 2 and REPERFORM those applicable surveillances required to be performed within the specified time frames prior to initiating core alterations. _____

UNIT NO. _____ INITIALS

4.5 POST-REFUELING OPERATIONS

CAUTION

Monitor Fuel Pool level frequently to verify gate is sealing.

4.5.1 Upon completion of Core Alterations and post refueling verification, CLOSE and SEAL the Fuel Pool To Transfer Canal Gate. _____

4.5.2 VERIFY that the Fuel Transfer System is in the stored position, then CLOSE and LOCK the Transfer Tube Gate Valve. _____

4.5.3 SHUT DOWN the Refueling Cavity Filtration System per 13719, "Spent Fuel Cooling And Purification System". _____

4.5.4 TERMINATE the use of this instruction and PROCEED to 12000-C, "Refueling Recovery (Mode 6 to Mode 5)". _____

COMPLETED: _____ / _____
Signature Date Time

REVIEWED: _____ / _____
Signature Date Time

COMMENTS: _____

_____

_____

_____

5.0 REFERENCES

5.1 "Preparations For Refueling", Westinghouse Refueling Guidelines.

5.2 PROCEDURES

5.2.1 13011, "Residual Heat Removal System"

5.2.2 13009, "CVCS Reactor Makeup Control System"

5.2.3 13105, "Safety Injection System"

5.2.4 13005, "Reactor Coolant System Draining"

5.2.5 13615, "Condensate And Feedwater Systems"

5.2.6 13719, "Spent Fuel Pool Cooling And Purification System"

5.2.7 14210, "Containment Building Penetrations Verification - Refueling"

5.2.8 12000-C, "Refueling Recovery (Mode 6 to Mode 5)"

5.2.9 93240-C, "Reactor Vessel Assembly/Disassembly Instructions"

END OF PROCEDURE TEXT

MODE 6 ENTRY CHECKLIST 1

UNIT NO. _____ INITIALS

1.0 Prior to entering in Mode 6, VERIFY the following has been successfully completed during the specified interval and the requirements therein are met for entry into Mode 6:

1.1 Within 31 days prior to entering Mode 6:

a. 14228, "Operations Monthly Surveillance Logs".

_____ / _____ _____ *
Date Time

b. 14514-C, "Fuel Handling Building Post-Accident Exhaust System Operability Test". (Only applicable with irradiated fuel in the FHB.)

_____ / _____ _____ *
Date Time

1.2 Within 7 days prior to entering Mode 6:

a. 14225, "Operations Weekly Surveillance Logs",

_____ / _____ _____ *
Date Time

b. 14423, "Source Range NIS Analog Channel Operational Test".

_____ / _____ _____ *
Date Time

1.3 Within 72 hours prior to entering Mode 6:

ENSURE that the more restrictive of the following reactivity conditions is met:

a. 14005, "Shutdown Margin Calculations", and DETERMINE that boron concentration necessary for Keff of less than 0.95.

Calculated Value _____ ppm

Sheet 2 of 2

UNIT NO. _____ INITIALS

b. An RCS boron analysis from Chemistry Department and VERIFY concentration is equal to or greater than 2000 ppm.

RCS Boron _____ ppm

_____ / _____ _____ *
Date Time

1.4 Within 12 hours prior to entering Mode 6:

COMPLETE 14000, "Operations Shift And Daily Logs", and VERIFY the requirements therein are met for entry into Mode 6.

_____ / _____ _____ *
Date Time

REVIEWED: _____ / _____
Signature Date Time

COMMENTS: _____

CORE ALTERATIONS CHECKLIST 2

UNIT NO. _____ INITIALS

1.0 Prior to establishing Core Alterations, VERIFY the following:

1.1 Within 7 days prior to establishing Core Alterations, VERIFY the Fuel Handling Machine load test and crane interlock/stop test has been successfully completed. (Only applicable prior to crane use.)

_____/_____ _____*
Date Time

1.2 Within 100 hours prior to establishing Core Alterations VERIFY the following:

a. The Refueling Machine Load Test has been successfully completed. (Only applicable during movement of fuel assemblies, rod control cluster assemblies, thimble plug assemblies, or control rod drive shafts within the reactor vessel.)

_____/_____ _____*
Date Time

b. The Load Test on each Auxiliary Hoist and associated Load Indicator used for movement of Drive Rods within the Reactor Vessel has been successfully completed. (Only applicable during movement of fuel assemblies, rod control cluster assemblies, thimble plug assemblies, or control rod drive shafts within the reactor vessel.)

_____/_____ _____*
Date Time

c. NOTIFY Maintenance to reset the Containment Personnel Lock Interlock System. _____

d. VERIFY that 14210, "Containment Building Penetrations Verification-Refueling", has been satisfactorily completed.

_____/_____ _____*
Date Time

Sheet 2 of 3

UNIT NO. _____ INITIALS

1.3 Within 24 hours prior to establishing Core Alterations:

NOTIFY Chemistry to perform analysis required per 35180-C, "Chemistry Control During Refueling".

_____/_____ _____*
Date Time

1.4 Within 8 hours prior to establishing Core Alterations:

COMPLETE 14423, "Source Range NIS Analog Channel Operational Test".

_____/_____ _____*
Date Time

1.5 Within 2 hours prior to establishing Core Alterations:

VERIFY that the Refueling Cavity water level is at least 217 feet - 0 inches elevation (23 feet above the Reactor Vessel flange). (Only applicable during fuel movement.)

Refueling Cavity Level_____ ft.

_____/_____ _____
Date Time

1.6 Within 1 hour prior to establishing Core Alterations:

a. VERIFY communications between the Control Room and personnel at the applicable Refueling Stations has been established using 14000, "Operations Shift And Daily Logs".

_____/_____ _____
Date Time

Sheet 3 of 3

UNIT NO. _____ INITIALS

b. VERIFY that the Reactor has been subcritical for at least 100 hours by recording the date and time of subcriticality. (Only applicable during movement of irradiated fuel in the reactor vessel.)

Subcritical _____ / _____
Date Time

Completed _____ / _____
Date Time

REVIEWED: _____ / _____
Signature Date Time

COMMENTS: _____

_____

_____

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MIDLOOP STEPS

2.1.2, 2.1.3, 2.1.8, 2.1.9, 2.1.10, 2.1.11, 2.2.1, 4.1.2, 4.1.8, 4.1.15, 4.1.16, 4.1.17, 4.1.20, 4.2.2, 4.2.11, 4.2.12, 4.2.14, 4.2.18, 4.2.19, 4.2.21

REACTOR COOLANT SYSTEM DRAINING

1.0 PURPOSE

This procedure provides the necessary instructions for partially draining the Reactor Coolant System (RCS). Procedure instructions include the following:

4.1 RCS Draining Via The RCDT

4.2 RCS Draining Via The RHR System

4.3 Preparation For Opening The RCS Following Draining Via The RCDT

4.4 Opening The RCS To Atmosphere

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

2.1.1 During the early stages of an RCS drain operation, a nitrogen gas blanket should be provided in the pressurizer and Reactor Vessel Head to avoid a hydrogen hazard when air is initially admitted to the system through the vents.

2.1.2 The RCS level shall be maintained greater than or equal to an elevation of 188 feet whenever the Residual Heat Removal (RHR) System is in service except for Steam Generator tube burping at which time level will be maintained at 187 feet 6 inches.

2.1.3 During draining to one foot above mid-nozzle (188 feet), trend RHR Pump parameters on ERF for early detection of possible RHR Pump degradation due to vortexing.

2.1.4 Seal injection flow to the Reactor Coolant Pump (RCP) seals shall be established if the water level in the RCS is above the level of the seals in the RCP. This prevents crud infiltration into the seal chamber.

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2.1.5 The RCS should not be drained to the point where air will enter the RCS from the pressurizer surge line, unless the proposed maintenance requires it. This prevents draining of the SG tubes.

2.1.6 Observe all applicable Health Physics procedures when venting radioactive gases and vapor.

2.1.7 The Health Physics Department should be notified prior to performing evolutions which may significantly affect radiation levels.

2.1.8 If it is intended to drain down to perform maintenance on Reactor Head, Steam Generators (SG's) or RCP Seals, then the following RCS Level Controls should be placed into effect:

a. If it is intended to operate at one foot above mid-nozzle level, the preferred RHR configuration is one train operating with a flow of 3000 gpm,

b. Tygon tube watch is required any time the RCS level is being changed while the RCS level is below 17% (approximately 207 feet elevation) pressurizer level,

c. Periodic comparison checks should be made every 4 hours between the Control Room temporary RCS Level Monitors and the Tygon tube,

d. The Control Room Monitors should agree within 7 percent of scale with the Tygon tube,

e. Two out of three Level Monitors must agree before draining RCS level below the top of the hot leg (188 feet - 3 inches),

f. If neither Control Room RCS Level Monitor is available, then a continuous Tygon tube watch should be established while RCS level is below 17% pressurizer level,

g. While level is in the region of the hot legs, trend RHR Pump parameters on ERF for early detection of possible RHR Pump degradation due to vortexing.

2.1.9 If level indication is lost or becomes suspect, draining will be stopped and the problem with the indication resolved. If necessary, raise RCS level to restore indications.

2.1.10 Only one drain path shall be used at a time and operators shall be aware of the path being used. Appropriate log entries shall be made to keep personnel aware of drain flow paths.

2.1.11 When draining via the Reactor Coolant Drain Tank (RCDT), do not drain from the same loop(s) that are being monitored for level.

2.2 LIMITATIONS

2.2.1 During Cold Shutdown (Mode 5) with the Reactor Coolant Loops filled, one RHR train shall be operable and in operation and either one additional train shall be operable or the secondary side water level of at least two Steam Generators shall be greater than 17% wide range. (Technical Specification 3.4.1.4.1)

SUPPORTS MIDLOOP

2.2.2 During Cold Shutdown (Mode 5) with Reactor Coolant Loops not filled, two RHR trains shall be operable with one train in operation. (Technical Specification 3.4.1.4.2)

3.0 PREREQUISITES AND INITIAL CONDITIONS

3.1 The Recycle Holdup Tanks are capable of receiving drain effluent.

3.2 The Liquid Waste Processing System is capable of receiving drain effluent.

3.3 The Auxiliary Gas System - Nitrogen is operating.

3.4 The Pressurizer Relief Tank (PRT) is in service, with 3-5 psig N_2 pressure.

3.5 The RCDT is in service with discharge aligned to the Recycle Holdup Tank.

3.6 The RHR System is operating with RHR letdown in service.

3.7 The RCS has been prepared for system draining per Section D of 12006-C, "Unit Cooldown To Cold Shutdown".

3.8 Communications have been established between the Control Room and Containment to ensure adequate RCS level and pressure monitoring during the draining operation.

4.0 INSTRUCTIONS

4.1 RCS DRAINING VIA THE RCDT

4.1.1 RACK OUT and TAG the applicable breakers per Table 1.

4.1.2 If the RCS is to be drained below 25% Pressurizer Cold Calibration Level 1-LI-0462, NOTIFY Maintenance to install the RCS level monitoring instrumentation per 54840-1, "Installation And Removal Instructions For The RCS Temperary Level Indication Tygon Tube And The Defeat Of The Residual Heat Removal Suction Valve Auto Closure Interlock".

4.1.3 NOTIFY Maintenance to install the spool piece in the common RCS Loop Drain Header upstream of Loop Drain Header Isolation 1-1901-U6-242.

4.1.4 VERIFY the Recycle Holdup Tanks have sufficient capacity to support draining operations.

4.1.5 ALIGN nitrogen from the PRT to the Pressurizer steam space as follows:

4.1.5.1 CONNECT temporary supply hose from the PRT Vent to the Pressurizer Spray Line Vent:

a. REMOVE Blind Flange at PRT Vent Valve 1-1201-U4-115 and INSTALL a Chicago fitting at flange,

b. ATTACH a hose to the Chicago fitting at valve 1-1201-U4-115,

c. REMOVE pipe cap at the Pressurizer Spray Line Vent Valve 1-1201-X4-084 and INSTALL a Chicago fitting,

d. ATTACH the other end of the hose installed in Step 4.1.5.1b to the Chicago fitting at Vent Valve 1-1201-X4-084.

NOTE

Ensure that the hose connected in Step 4.1.5.1d slopes upward or vertical all the way from the PRT to the Pressurizer Spray Line Vent with no restricting kinks.

4.1.5.2 ALIGN nitrogen through the Pressurizer Safety Loop Seal Drain Header.

a. ENSURE CLOSED Reactor Head Vents To Pressurizer Relief Tank 1-HV-0442A and 1-HV-0442B,

b. ENSURE OPEN Pressurizer Relief Tank Nitrogen Supply Isolations 1-HV-8033 and 1-HV-8047,

c. ENSURE OPEN Pressurizer Sprays 1-PV-0455B and 1-PV-0455C,

d. OPEN Pressurizer Safety Loop Seal Drain Header Isolation 1-1201-U4-105,

e. OPEN Pressurizer Safety 1-PSV-8010A Loop Seal Drain 1-1201-U4-102.

4.1.5.3 ALIGN nitrogen through the temporary hose connection from PRT to Pressurizer Spray Line Vent:

a. OPEN PRT Vent valve 1-1201-U4-115,

b. OPEN Pressurizer Spray Line Vent Valves 1-1201-X4-072 and 1-1201-X4-084.

4.1.6 ALIGN the Reactor Coolant Drain Tank (RCDT) and pumps as follows:

NOTE

All controls are located on local Panel PLPP unless otherwise noted.

a. ENSURE both RCDT Pumps are stopped:

(1) RCDT Pump #1, 1-HS-1003A,

(2) RCDT Pump #2, 1-HS-1003B.

b. CLOSE RCDT Recirculation 1-HV-7144,

c. CLOSE RCDT Outlet Isolation 1-HV-7127,

d. ENSURE RCDT To PRT Isolation 1-HV-7141 is closed,

e. UNLOCK and OPEN RCDT Level Control Bypass 1-1901-U5-038,

f. At Control Room Panel QMCB, ENSURE OPEN RCDT Pump Discharge Inside and Outside Containment Isolations 1-HV-7699 and 1-HV-7136.

4.1.7 UNLOCK and OPEN RCS Loop Drain Header Isolation 1-1901-U6-242.

CAUTION

Do not drain from the same loop(s) that are being monitored for RCS level.

4.1.8 OPEN at least one pair of the following valves to allow draining of the RCS:

4.1.8.1 RC Loop 2 Drain Isolation 1-1201-U4-052

RC Loop 2 Drain To RCDT Isolation 1-1201-U4-208

4.1.8.2 RC Loop 3 Drain Isolation 1-1201-U4-030

RC Loop 3 Drain To RCDT Isolation 1-1201-U4-209

4.1.8.3 RC Loop 4 Drain Isolation 1-1201-U4-071

RC Loop 4 Drain To RCDT Isolation 1-1201-U4-206

NOTE

Draining the RCS commences with the start of the RCDT Pumps.

4.1.9 DRAIN the RCS to 50% Pressurizer Level 1-LI-0462 as follows:

a. START at least one RCDT Pump,

(1) RCDT Pump #1 using 1-HS-1003A,

(2) RCDT Pump #2 using 1-HS-1003B.

CAUTION

The PRT Rupture Disks may fail if a vacuum is drawn in the PRT.

b. MONITOR PRT Pressure 1-PI-0469,

c. MONITOR RCS Pressure on the temporary gauge at 1-1201-U4-100,

NOTES

a. If the activity level in the Waste Gas Decay Shutdown Tank is sufficiently low to conform to ALARA as determined by Health Physics and Chemistry, the Waste Gas System may be used to supply nitrogen for draining the RCS. If Waste Gas System is used, refer to Step 4.1.2 of 13004-1, "Pressurizer Relief Tank Operation".

b. At the discretion of the Unit Shift Supervisor (USS), Nitrogen (N_2) pressure may be raised above normal pressure in the PRT to enhance maintenance of a positive pressure in the RCS and the PRT.

d. ADJUST PRT Nitrogen Supply Regulator 1-PCV-8034 or CYCLE RCDT Pumps as necessary to maintain a positive PRT Pressure 1-PI-0469.

4.1.10 At 50% Pressurizer Level 1-LI-0462, STOP draining as follows:

a. ENSURE both RCDT Pumps are stopped:

(1) RCDT Pump #1, 1-HS-1003A,

(2) RCDT Pump #2, 1-HS-1003B.

b. CLOSE RCDT Pump Discharge Inside Containment Isolation 1-HV-7699.

4.1.11 If it is desired to stop draining and open the RCS, PERFORM Step 4.3.

NOTE

The Reactor Vessel Flange is at an elevation of 194 feet.

4.1.12 To continue draining the RCS to the Reactor Vessel Flange, PLACE the Tygon hose level indication in service as follows:

a. Slowly OPEN Pressurizer Steam Space Sample Vent 1-1201-U4-100,

b. OPEN RCS Loop 1 Drain Isolation 1-1201-U4-001,

c. Slowly OPEN RCS Loop 1 Tygon Hose Connection Isolation 1-1201-U4-003.

4.1.13 NOTIFY I&C Department to install the remote RCS level monitoring instrumentation per 23985-1, "RCS Temporary Water Level System".

4.1.14 If the Reactor Vessel Head has not been vented to atmosphere per Step 4.4, then SUPPLY N_2 to the Reactor Vessel Head as follows:

a. ENSURE CLOSED RCS Excess Letdown Heat Exchanger Inlet 1-HV-8098,

b. OPEN all Reactor Head Vent Isolations:

(1) 1-HV-8095A,

(2) 1-HV-8096A,

(3) 1-HV-8095B,

(4) 1-HV-8096B.

c. OPEN both Reactor Head Vents To Pressurizer Relief Tank:

(1) 1-HV-0442A,

(2) 1-HV-0442B.

CAUTION

Maintain a positive pressure in the RCS. Do not drain the RCS at a rate faster than nitrogen can be fed into the RCS. A negative pressure may collapse the Tygon hose, cause a false reading on Tygon tube vessel level indication and the pressurizer level indication.

4.1.15 DRAIN the RCS to an elevation of 194 feet as indicated by the Tygon hose as follows:

a. OPEN RCDT Pump Discharge Inside Containment Isolation 1-HV-7699 by holding 1-HS-7699 in OPEN until the valve is fully open,

b. START at least one RCDT Pump:

(1) 1-HS-1003A for RCDT Pump #1,

(2) 1-HS-1003B for RCDT Pump #2.

CAUTION

The PRT Rupture Disks may fail if a vacuum is drawn in the PRT.

c. MONITOR PRT Pressure 1-PI-0469,

d. MONITOR RCS Pressure on the temporary gauge at 1-1201-U4-100,

NOTE

If the activity level in the Waste Gas Decay Shutdown Tank is sufficiently low to conform to ALARA as determined by Health Physics and Chemistry, the Waste Gas System may be used to supply nitrogen for draining the RCS. If Waste Gas System is used, refer to Step 4.1.2 of 13004-1, "Pressurizer Relief Tank Operation".

e. ADJUST PRT Nitrogen Supply Regulator 1-PCV-8034 or CYCLE RCDT Pumps as required to maintain a positive PRT Pressure 1-PI-0469.

4.1.16 At 194 feet, STOP draining as follows:

a. ENSURE both RCDT Pumps are stopped:

(1) RCDT Pump #1, 1-HS-1003A.

(2) RCDT Pump #2, 1-HS-1003B.

b. CLOSE RCDT Pump Discharge Inside Containment Isolation 1-HV-7699.

4.1.17 If it is desired to stop draining and open the RCS, PERFORM Step 4.3.

4.1.18 At the USS discretion, Steam Generator Tube bundles may be drained by the addition of nitrogen to the Steam Generator Channel Heads per Checklist 1.

CAUTIONS

a. If the Steam Generators were not drained per Step 4.1.18, then as the RCS water level reaches the Reactor Vessel Nozzles, the coolant will begin to drain from the SG's in slugs causing erratic level indication.

b. Upon approaching RCS hot leg region, trend RHR Pump parameters on ERF for early detection of possible RHR Pump degradation due to vortexing.

NOTE

The middle of the vessel nozzles is at an elevation of 187 feet.

4.1.19 To continue draining the RCS to the 188 feet - 0 inches elevation, PERFORM the following:

a. OPEN RCDT Pump Discharge Inside Containment Isolation 1-HV-7699 by holding 1-HS-7699 in OPEN until the valve is fully open,

b. START at least one RCDT Pump:

(1) RCDT Pump #1, 1-HS-1003A,

(2) RCDT Pump #2, 1-HS-1003B.

CAUTION

The PRT Rupture Disks may fail if a vacuum is drawn in the PRT.

c. MONITOR PRT Pressure 1-PI-0469,

d. MONITOR RCS Pressure on the temporary gauge at 1-1201-U4-100,

e. ADJUST PRT Nitrogen Supply Regulator 1-PCV-8034 or CYCLE RCDT Pumps as required to maintain a positive PRT Pressure 1-PI-0469.

NOTE

If the Steam Generators were not drained per Step 4.1.18, then during burping of the SGs the level should be lowered to elevation 187 feet 6 inches to facilitate SG draining. Level will be erratic during this operation, and should be closely monitored. When SG draining is complete, raise and maintain level at 188 feet.

4.1.20 At 188 feet, STOP draining as follows:

a. ENSURE both RCDT Pumps are stopped:

(1) RCDT Pump #1, 1-HS-1003A,

(2) RCDT Pump #2, 1-HS-1003B.

b. CLOSE RCDT Pump Discharge Inside Containment Isolation 1-HV-7699.

4.1.21 If the SG Manways are to be opened, then DRAIN the SG Channel Head by opening the applicable SG Channel Head Drain Line Isolation and Root Valves:

a. SG 1 1-1201-U4-202,
1-1201-U4-247,

b. SG 2 1-1201-U4-203,
1-1201-U4-248,

c. SG 3 1-1201-U4-204,
1-1201-U4-249,

d. SG 4 1-1201-U4-205,
1-1201-U4-250.

NOTE

SG Channel Head Drain Valves will remain open while manways are off.

4.1.22 To open the RCS, PERFORM Step 4.3.

4.2 RCS DRAINING VIA THE RHR SYSTEM

4.2.1 RACK OUT and TAG the applicable breakers per Table 1.

4.2.2 If the RCS is to be drained below 25% Pressurizer Cold Calibration Level 1-LI-0462, NOTIFY Maintenance to install RCS level monitoring instrumentation per 54840-1, "Installation And Removal Instructions For The RCS Temporary Level Indication Tygon Tube And The Defeat of The Residual Heat Removal Suction Valve Auto Closure Interlock".

4.2.3 VERIFY the Recycle Holdup Tanks have sufficient capacity to support draining operations.

4.2.4 ALIGN nitrogen from the PRT to the Pressurizer steam space as follows:

4.2.4.1 CONNECT nitrogen supply hose from the PRT Vent to the Pressurizer Spray Line Vent:

a. REMOVE blind flange at PRT Vent Valve 1-1201-U4-115 and INSTALL a Chicago fitting at flange,

b. ATTACH a hose to the Chicago fitting at valve 1-1201-U4-115,

c. REMOVE pipe cap at Pressurizer Spray Line Vent valve 1-1201-X4-084 and INSTALL a Chicago fitting,

d. ATTACH the other end of the hose installed in Step 4.2.4.1b to the Chicago fitting at Vent Valve 1-1201-X4-084.

NOTE

Ensure that the hose connected in Step 4.2.4.1b slopes upward or vertical all the way from the PRT to the Pressurizer Spray Line Vent with no restricting kinks.

4.2.4.2 ALIGN nitrogen through the Pressurizer Safety Loop Seal Drain Header.

a. ENSURE CLOSED Reactor Head Vents To Pressurizer Relief Tank 1-HV-0442A and 1-HV-0442B,

b. ENSURE OPEN Pressurizer Relief Tank Nitrogen Supply Isolations 1-HV-8033 and 1-HV-8047,

c. ENSURE OPEN Pressurizer Sprays 1-PV-0455B and 1-PV-0455C,

d. OPEN Pressurizer Safety Loop Seal Drain Header Isolation 1-1201-U4-105,

e. OPEN Pressurizer Safety 1-PSV-8010A Loop Seal Drain 1-1201-U4-102,

4.2.4.3 ALIGN nitrogen through the temporary hose connection from PRT to the Pressurizer Spray Line Vent.

a. OPEN PRT Vent Valve 1-1201-U4-115,

b. OPEN Pressurizer Spray Line Vent Valves 1-1201-X4-072 and 1-1201-X4-084.

4.2.5 ENSURE RHR letdown is in service.

4.2.6 INITIATE RCS draining as follows:

NOTE

If chemistry conditions require draining through the CVCS mixed bed, 1-TV-0129 must be positioned to the CVCS mixed bed.

a. PLACE Letdown To Demin/VCT, 1-TV-0129 to the VCT,

b. PLACE Letdown Divert 1-HV-0112A in the HUT position,

NOTE

Letdown flow should be limited to 120 gpm to prevent exceeding design flow through the Mixed Bed Demineralizer and the Reactor Coolant Filter.

c. ADJUST Letdown Pressure Controller 1-PIC-0131 as required to obtain the desired Letdown Flow 1-FI-0132A (RCS drain rate),

CAUTION

The PRT Rupture Disks may fail if a vacuum is drawn in the PRT.

d. MONITOR PRT Pressure 1-PI-0469,

NOTES

a. If the activity level in the Waste Gas Decay Shutdown Tank is sufficiently low to conform to ALARA as determined by Health Physics and Chemistry, the Waste Gas System may be used to supply nitrogen for draining the RCS. If Waste Gas System is used, refer to 13004-1, "Pressurizer Relief Tank Operation".

b. At the discretion of the USS, N_2 pressure may be raised above normal pressure in the PRT to enhance maintenance of a positive pressure in the RCS and PRT.

e. ADJUST PRT Nitrogen Supply Regulator 1-PCV-8034 or 1-PIC-0131 as required to maintain a positive PRT Pressure 1-PI-0469.

4.2.7 MAINTAIN VCT Level 1-LI-0185 between 30% and 50% while draining as follows:

a. When 1-LI-0185 falls to 30%, PLACE Letdown Divert 1-HV-0112A in the VCT position,

b. When 1-LI-0185 rises to 50%, PLACE 1-HV-0112A in the HUT position.

4.2.8 MONITOR Pressurizer Level 1-LI-0462.

4.2.9 At 50% Pressurizer Level 1-LI-0462, STOP draining as follows:

a. PLACE Letdown Divert 1-HV-0112A in the VCT position,

b. ADJUST Letdown Pressure Controller 1-PIC-0131 and/or charging and seal injection to maintain Pressurizer Level 1-LI-0462 between 40% and 50%.

4.2.10 If it is desired to stop draining and open the RCS, PERFORM Step 4.4.

NOTE

The Reactor Vessel Flange is at an elevation of 194 feet.

4.2.11 To continue draining the RCS to the Reactor Vessel Flange, PLACE the Tygon hose level indication in service as follows:

a. Slowly OPEN Pressurizer Steam Space Sample Vent 1-1201-U4-100,

b. OPEN RC Loop 1 Drain Isolation 1-1201-U4-001,

c. Slowly OPEN RC Loop 1 Tygon Hose Connection Isolation 1-1201-U4-003.

4.2.12 NOTIFY I&C Department to install the remote RCS level monitoring instrumentation per 23985-1, "RCS Temporary Water Level System".

4.2.13 If the Reactor Vessel Head has not been vented to atmosphere per Step 4.4, then SUPPLY N_2 to the Reactor Vessel Head as follows:

a. ENSURE CLOSED RCS Excess Letdown Heat Exchanger Inlet 1-HV-8098,

b. OPEN all Reactor Head Vent Isolations:

(1) 1-HV-8095A,

(2) 1-HV-8096A,

(3) 1-HV-8095B,

(4) 1-HV-8096B.

c. OPEN both Reactor Head Vents To Pressurizer Relief Tank:

(1) 1-HV-0442A,

(2) 1-HV-0442B.

CAUTION

Maintain a positive pressure in the RCS. Do not drain the RCS at a rate faster than nitrogen can be fed into the RCS. A negative pressure may collapse the Tygon hose, cause a false reading on the Tygon tube and the pressurizer level indication.

4.2.14 DRAIN the RCS to an elevation of 194 feet as indicated by the Tygon hose as follow :

a. PLACE Letdown Divert 1-HV-0112A in the HUT position,

NOTE

Letdown flow should be limited to 120 gpm to prevent exceeding design flow through the Mixed Bed Demineralizer and the Reactor Coolant Filter.

b. ADJUST Letdown Pressure Controller 1-PIC-0131 as required to obtain the desired Letdown Flow 1-FI-0132A (RCS drain rate),

CAUTION

The PRT Rupture Disks may fail if a vacuum is drawn in the PRT.

c. MONITOR PRT Pressure 1-PI-0469,

d. MONITOR RCS Pressure on the temporary gauge at 1-1201-U4-100,

NOTE

If the activity level in the Waste Gas Decay Shutdown Tank is sufficiently low to conform to ALARA as determined by Health Physics and Chemistry, the Waste Gas System may be used to supply nitrogen for draining the RCS. If Waste Gas System is used, refer to Step 4.1.2 of 13004-1, "Pressurizer Relief Tank Operation".

e. If applicable, ADJUST PRT Nitrogen Supply Regulator 1-PCV-8034 or 1-PIC-0131 as required to maintain a positive PRT Pressure 1-PI-0469.

4.2.15 MAINTAIN VCT Level 1-LI-0185 between 30% and 50% while draining as follows:

a. When 1-LI-0185 falls to 30%, PLACE Letdown Divert 1-HV-0112A in the VCT position,

b. When 1-LI-0185 rises to 50%, PLACE 1-HV-0112A in the HUT position.

4.2.16 At 194 feet, STOP draining as follows:

a. PLACE Letdown Divert 1-HV-0112A in the VCT position,

b. ADJUST Letdown Pressure Controller 1-PIC-0131 and/or charging and seal injection to MAINTAIN RCS level at 194 feet.

4.2.17 If it is desired to stop draining and open the RCS, PERFORM Step 4.4.

4.2.18 At the USS discretion, Steam Generator Tube bundles may be drained by addition of nitrogen to the Steam Generator Channel Heads per Checklist 1.

CAUTIONS

a. If the Steam Generators were not drained per Step 4.2.18, then as the RCS water level reaches the Reactor Vessel Nozzles, the coolant will begin to drain from the SG's in slugs causing erratic level indication.

b. Upon approaching RCS hot leg region, closely monitor RHR Pump suction and discharge pressure as well as RHR flow rate to ensure early detection of RHR degradation due to vortexing at the RHR Pump suction.

NOTE

The middle of the vessel nozzles is at an elevation of 187 feet.

4.2.19 To continue draining the RCS to 188 feet - 0 inches elevation, PERFORM the following:

a. PLACE Letdown Divert 1-HV-0112A in the HUT position,

NOTE

Letdown flow should be limited to 120 gpm to prevent exceeding design flow through the Mixed Bed Demineralizer and the Reactor Coolant Filter.

b. ADJUST Letdown Pressure Controller 1-PIC-0131 as required to obtain the desired Letdown Flow 1-FI-0132A (RCS drain rate),

CAUTION

The PRT Rupture Disks may fail if a vacuum is drawn in the PRT.

c. MONITOR PRT Pressure 1-PI-0469,

d. MONITOR RCS Pressure on the temporary gauge at 1-1201-U4-100,

e. If applicable, ADJUST PRT Nitrogen Supply Regulator 1-PCV-8034 or 1-PIC-0131 as required to maintain a positive PRT Pressure 1-PI-0469.

4.2.20 MAINTAIN VCT Level 1-LI-0185 between 30% and 50% while draining as follows:

a. When 1-LI-0185 falls to 30%, PLACE Letdown Divert 1-HV-0112A in the VCT position,

b. When 1-LI-0185 rises to 50%, PLACE 1-HV-0112A in the HUT position.

NOTE

If the Steam Generators were not drained per Step 4.2.18, then during burping of the SGs, the level should be lowered to elevation 187 feet 6 inches to facilitate SG draining. Level will be erratic during this operation, and should be closely monitored. When SG draining is complete, raise and maintain level at 188 feet.

4.2.21 At 188 feet STOP draining as follows:

a. PLACE Letdown Divert 1-HV-0112A in the VCT position,

b. ADJUST Letdown Pressure Controller 1-PIC-0131 and/or charging and seal injection to maintain RCS level at 188 feet.

4.2.22 If the SG Manways are to be opened, then DRAIN the SG Channel Head by opening the applicable SG Channel Head Drain Line Isolation and Root Valves:

a. SG 1 1-1201-U4-202,
1-1201-U4-247,

b. SG 2 1-1201-U4-203,
1-1201-U4-248,

c. SG 3 1-1201-U4-204,
1-1201-U4-249,

d. SG 4 1-1201-U4-205,
1-1201-U4-250.

NOTE

SG Channel Head Drain Valves will remain open while manways are off.

4.2.23 To open the RCS, PERFORM Step 4.4.

4.3 PREPARATION FOR OPENING THE RCS FOLLOWING DRAINING VIA THE RCDT

4.3.1 RESTORE normal RCDT alignment as follows:

a. CLOSE and LOCK RCS Loop Drain Header Isolation 1-1901-U6-042,

CLOSE and LOCK RCDT Level Control Bypass 1-1901-U6-038,

c. OPEN RCDT Outlet Isolation 1-HV-7127,

d. OPEN RCDT Recirculation 1-HV-7144,

e. OPEN RCDT Pump Discharge Inside Containment Isolation 1-HV-7699 by holding 1-HS-7699 in OPEN until 1-HV-7699 is fully open.

4.3.2 ENSURE CLOSED the following Loop Drain Valves:

a. RC Loop 2 Drain Isolation 1-1201-U4-052,

b. RC Loop 2 Drain To RCDT Isolation 1-1201-U4-208,

c. RC Loop 3 Drain Isolation 1-1201-U4-030,

d. RC Loop 3 Drain To RCDT Isolation 1-1201-U4-209,

e. RC Loop 4 Drain Isolation 1-1201-U4-071,

f. RC Loop 4 Drain To RCDT Isolation 1-1201-U4-206.

4.3.3 CLOSE PRT Vent Valve 1-1201-U4-115.

4.3.4 CLOSE Pressurizer Spray Line Vent Valves 1-1201-X4-072 and 1-1201-X4-084.

4.3.5 ALIGN RCDT discharge to the Waste Holdup Tank as follows:

a. OPEN RCDT To LWPS Isolation 1-1901-U6-040,

b. CLOSE Unit 1 RCDT Pump To Recycle Evaporator Feed Demineralizer Isolation 1-1901-U4-327.

4.3.6 START one RCDT Pump:

a. RCDT Pump #1, 1-HS-1003A,

b. RCDT Pump #2, 1-HS-1003B.

4.3.7 ISOLATE the VCT from the Waste Gas Processing System as follows:

a. ENSURE CLOSED Isolation Valve Waste Gas Decay Shutdown Tank To VCT 1-1208-U4-352,

b. ENSURE CLOSED VCT TO GWPS ISO VLV 1-PV-0115.

4.3.8 VENT the RCS to atmosphere per Step 4.4.

4.4 OPENING THE RCS TO ATMOSPHERE

NOTE

The hoses used for venting should be routed to the Purge Ventilation System exhaust.

4.4.1 NOTIFY Maintenance to REMOVE the Blind Flange and install a venting hose at Pressurizer Safety Relief Header Vent 1-1201-U4-106, or to REMOVE pipe cap at Pressurizer Spray Line Vent Valve 1-1201-X4-084 and INSTALL a Chicago Fitting and Venting Hose.

4.4.2 NOTIFY Maintenance to remove the Blind Flange and install a venting hose at Reactor Vessel Head Vent System Vent Flow Gauge 1-FG-8099.

4.4.3 NOTIFY Maintenance to remove the Blind Flange and install a venting hose at Reactor Vessel Head Vent System Vent 1-1201-U4-086.

NOTE

At the discretion of the USS, the Pressurizer (PRZR) Safety Loop Seal Drain Header Isolation 1-1201-U4-105 may be left open to vent the PRT until desired pressure in the PRT is obtained, provided the N_2 supply to the PRT has been returned to normal or isolated.

4.4.4 If Pressurizer Spray Line Vent Valve 1-1201-X4-084 is to be used for venting, CONTINUE with Step 4.4.5, otherwise, CLOSE Pressurizer Safety Loop Seal Drain Header Isolation 1-1201-U4-105.

4.4.5 OPEN Pressurizer Safety 1-PSV-8010A Loop Seal Drain 1-1201-U4-102.

4.4.6 To vent the pressurizer to atmosphere, OPEN Pressurizer Safety Relief Header Vent 1-1201-U4-106, or OPEN Pressurizer Spray Line Vent Valves 1-1201-X4-072 and 1-1201-X4-084.

4.4.7 VENT the Vessel Head to atmosphere as follows:

a. ENSURE CLOSED Reactor Head Vents To Pressurizer Relief Tank 1-HV-0442A and 1-HV-0442B,

b. OPEN all Reactor Head Vent Isolations:

(1) 1-1208-U4-488, Isolation for 1-FG-8099,

(2) 1-1208-U4-086,

(3) 1-HV-8095A,

(4) 1-HV-8096A,

(5) 1-HV-8095B,

(6) 1-HV-8096B.

5.0 REFERENCES

5.1 TECHNICAL SPECIFICATIONS

5.1.1 Technical Specification 3.4.1.4.1

5.1.2 Technical Specification 3.4.1.4.2

5.2 FSAR

5.2.1 Section 5.1

5.2.2 Section 5.2

5.2.3 Section 5.3

5.2.4 Section 5.4

5.3 PROCEDURES

5.3.1 13703-C, "Boron Recycle System"

5.3.2 13214-1, "Liquid Waste Processing System"

5.3.3 13707-C, "Auxiliary Gas System - Nitrogen"

5.3.4 13004-1, "Pressurizer Relief Tank Operation"

5.3.5 13002-1, "Reactor Coolant Drain Tank Operation"

5.3.6	13011-1	"Residual Heat Removal System"
5.3.7	12006-C,	"Unit Cooldown To Cold Shutdown"
5.3.8	54840-1,	"Installation And Removal Instructions For The RCS Temporary Level Indication Tygon Tube And The Defeat Of The Residual Heat Removal Suction Valve Auto Closure Interlock"
5.3.9	23985-1,	"RCS Temporary Water Level System"
5.4	P&ID's	
5.4.1	1X4DB111	Reactor Coolant System
5.4.2	1X4DB112	Reactor Coolant System
5.4.3	1X4DB114	Chemical And Volume Control System
5.4.4	1X4DB127	Waste Processing System - Liquid
5.5	ONE LINE DIAGRAMS	
5.5.1	1X3D-AA-H01A	125V DC Class 1E Distribution Train A
5.5.2	1X3D-AA-H02A	125V DC Class 1E Distribution Train B
5.6	ELEMENTARY DIAGRAMS	
5.6.1	1X3D-BD-B03F	Reactor Coolant System 1-PV-0456A
5.6.2	1X3D-BD-B03H	Reactor Coolant System 1-PV-0455A
5.6.3	1X3D-BD-B03R	Reactor Coolant System 1-PV-0455B/0455C
5.6.4	1X3D-BD-C05F	CVCS 1-HV-8095B/8096B
5.6.5	1X3D-BD-C05G	CVCS 1-HV-8095A/8096A
5.6.6	1X3D-BD-C05H	CVCS 1-HV-0442A/0442B

END OF PROCEDURE TEXT

TABLE 1

COMPONENT NAME	BKR NUMBER	POSITION
#1 RCP	1AAA	RACKED OUT
#2 RCP	1BAB	RACKED OUT
#3 RCP	1CAC	RACKED OUT
#4 RCP	1DAD	RACKED OUT
PRESSURIZER HEATER PANEL 1NBPB1	1NB01-05	RACKED OUT
PRESSURIZER HEATER PANEL 1NBPB2	1NB10-05	RACKED OUT
PRESSURIZER HEATER PANEL 1NBPB3	1NB09-12	RACKED OUT
PRESSURIZER HEATER PANEL 1NBPC	1NB08-12	RACKED OUT

CHECKLIST 1

STEAM GENERATOR TUBE BUNDLE DRAINING

INITIALS

1.0 Notify the Unit Shift Supervisor (USS) and install two 2000 psig nitrogen bottles with regulators to each Steam Generator Channel Head Drain Line Root Valve

SG 1 1-1201-U4-202 _____

_____ IV

SG 2 1-1201-U4-203 _____

_____ IV

SG 3 1-1201-U4-204 _____

_____ IV

SG 4 1-1201-U4-205 _____

_____ IV

2.0 Drain each Steam Generator one at a time by performing the following:

NOTE

The order of draining Steam Generators and the decision for multiple draining is at the USS discretion.

2.1 Cut in the nitrogen bottles and set the Nitrogen Regulator to approximately 15 psig.

Sheet 2 of 3

CHECKLIST 1

STEAM GENERATOR TUBE BUNDLE DRAINING

		INITIALS
2.2	Open the SG Channel Head Drain Isolation Root.	
	SG 1 1-1201-U4-202	_____
	SG 2 1-1201-U4-203	_____
	SG 3 1-1201-U4-204	_____
	SC 4 1-1201-U4-205	_____
2.3	Slowly open the SG Channel Head Drain Isolation.	
	SG 1 1-1201-U4-247	_____
	SG 2 1-1201-U4-248	_____
	SG 3 1-1201-U4-249	_____
	SG 4 1-1201-U4-250	_____

NOTE

Volume of the Steam Generator primary side is about 966 cubic feet.

2.4 When RCS level stops rising, isolate the nitrogen supply by closing the Channel Head Drain Isolation and Root Valves.

2.5 Drain the RCS to restore level to Reactor Vessel Flange level (194 feet) per Step 4.1 of this procedure.

2.6 Repeat Steps 2.1 through 2.5 for the remaining Steam Generators.

CHECKLIST 1

STEAM GENERATOR TUBE BUNDLE DRAINING

NOTE

If the SG Manways are to be opened, then leave hoses attached and route to floor drain.

			INITIALS
3.0	Remove the nitrogen bottles and regulators from the Channel Head Drain Lines and notify the USS.		
3.1	Verify Steam Generator Channel Head Drain Line Isolation and Root Valves closed, nitrogen bottles removed.		
	SG 1	1-1201-U4-202	_____
		1-1201-U4-247	_____
	SG 2	1-1201-U4-203	_____
		1-1201-U4-248	_____
	SG 3	1-1201-U4-204	_____
		1-1201-U4-249	_____
	SG 4	1-1201-U4-205	_____
		1-1201-U4-250	_____